RUDDER MANUAL TRIM JACK - MAINTENANCE PRACTICES

1. Removal/Installation Rudder Manual Trim Jack Assembly (see Figure 201)

A. Equipment Required.

(1) Stands suitable for reaching lower portion of vertical stabilizer and tail cone forward access door.

(2) Tools 30-15000-901 RGTL # 1 for streamlining rudder with vertical stabilizer and 30-51000-901 RGTL # 2 for streamlining rudder trim tab with rudder surface.

(3) Standard cable tensiometer.

B. Remove Rudder Manual Trim Jack Assembly.

(1) Open tail cone forward access door. Open rudder No. 1 and 2 hinge support access doors, bottom shroud door, and remove bottom half of rear vertical access panel on left side of vertical stabilizer.

(2) Loosen and disconnect two trim cable turnbuckles located in tail cone.

(3) Remove keepers from two pairs of trim cable pulleys located in vertical stabilizer between top of fuselage and first rib.

(4) Clamp trim cables with wood blocks close to trim jack drum and draw trim cables through pulleys.

(5) Disconnect forward end of two control rods connecting rudder trim jack to rudder trim tab horn. Replace bolts in control rods for installation.

(6) Remove eight bolts attaching rudder trim jack assembly to stabilizer structure and remove assembly through access opening in No. 2 hinge rib.

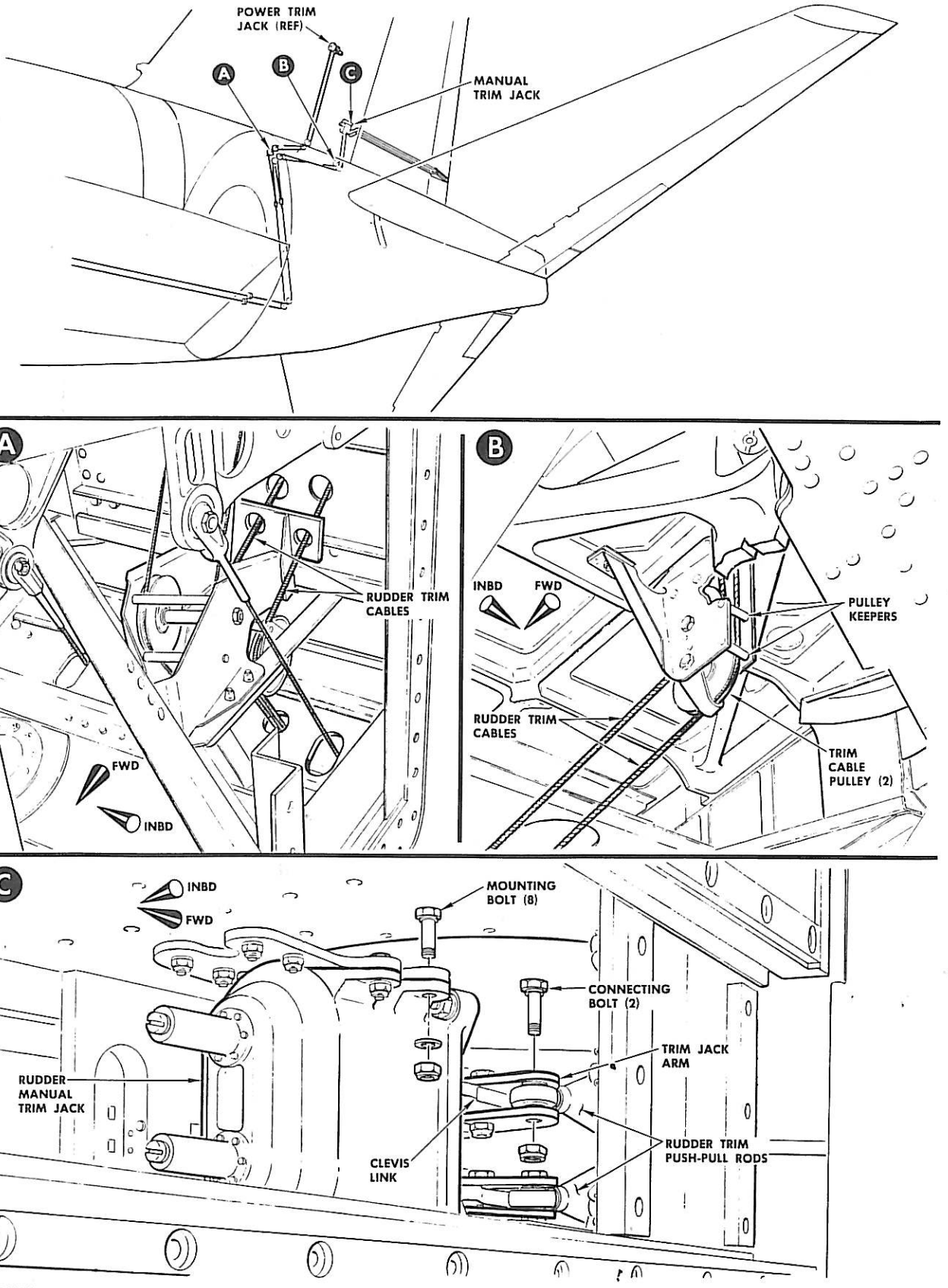
C. Install Rudder Manual Trim Jack.

(1) Check manual trim jack assembly to make sure that center of hole in forked end of screw is 1.35 (±0.03) inches away from aft face of screw jack housing (trim jack drum is centered when three and one-half turns of cable are on each end of drum and cable ends are exactly even with each other).

NOTE: Center of hole in forked end of screw shall be 1.45 (±0.03) inches away from aft face of screw jack housing on trim jacks not modified per Service Bulletin No. A27-29A.

(2) Position manual trim jack assembly in vertical stabilizer and install eight mounting bolts.

(3) Route trim cables over two pairs of pulleys in lower portion of vertical stabilizer and install pulley keepers.



Rudder Manual Trim Jack Installation
Figure 201

(4) Install tool 30-15000-901 RGTL #1 and secure rudder in streamline position (see 27-7-0, Figure 203).

(5) Install tool 30-15000-901 RGTL #2 and secure rudder trim tab in streamline position (see 27-7-0, Figure 203).

(6) Make sure that trim jack is centered. Adjust one trim tab control rod to fit between centered trim jack and rigged trim tab.

(7) Remove locking devices on tools 30-15000-901 RGTL #1 and #2. Leave tools installed to measure surface travel.

(8) Rig trim cables (refer to 27-8-0, Adjustment/Test Rudder Trim System Rigging Procedure).

(9) Move trim tab to full right position and adjust trim tab control rod not installed in Step (6) to length between trim jack and trim tab so attachment bolt may be inserted and removed freely. Do not install nut.

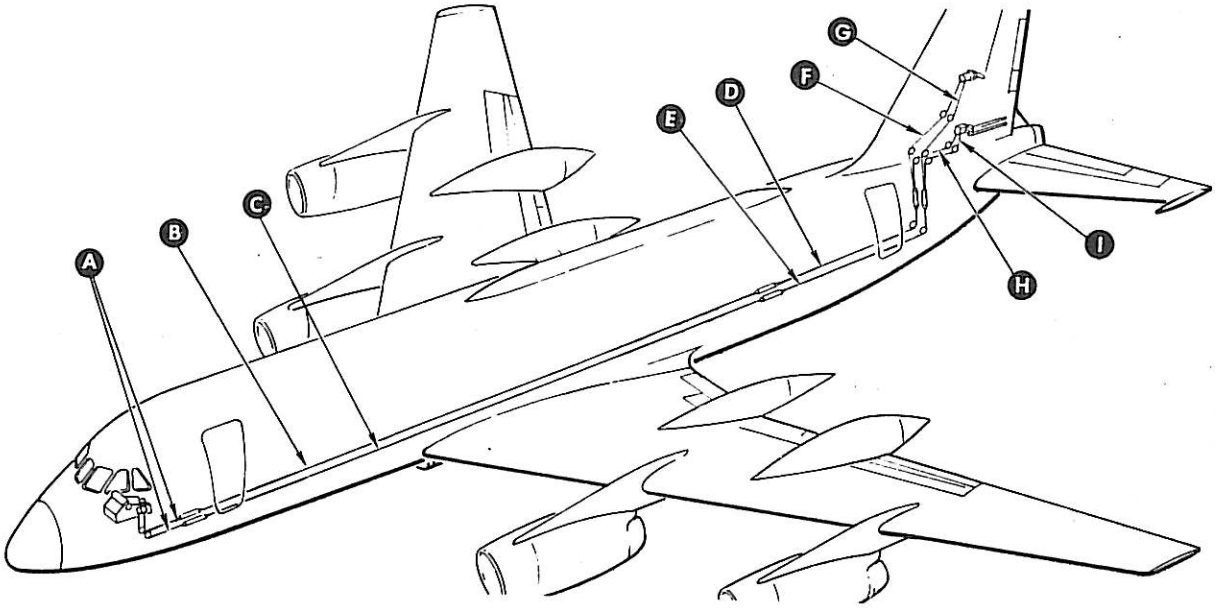
(10) Move trim tab to full left position and attempt to insert bolt. For final adjustment, attachment bolt must be inserted and removed freely when trim tab is in either full travel position.

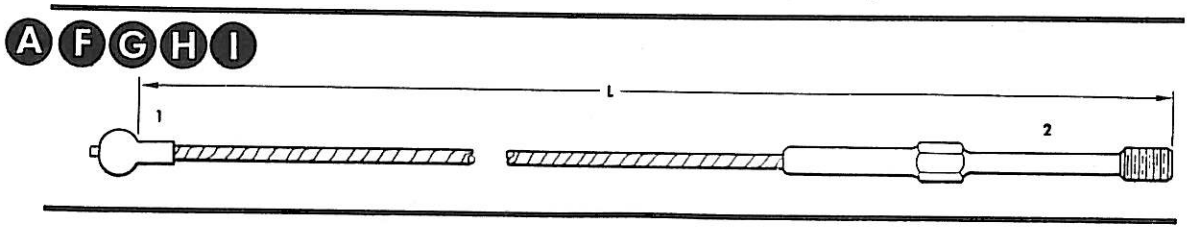
(11) Install bolt and tighten check nut on rod end.

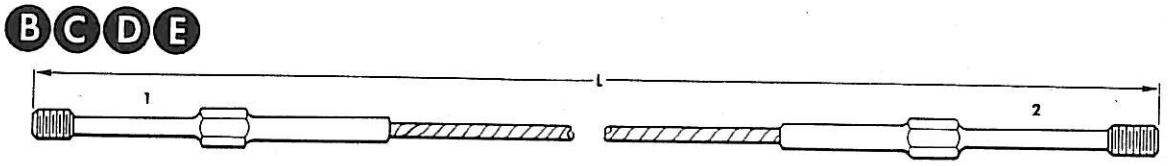
(12) Test system (refer to 27-8-0, Adjustment/Test Rudder Trim System Functional Test).

NOTE: If a rudder manual trim jack only has been replaced and no other rigging or adjustment has been changed, check rudder trim system operation per 27-7-0, paragraph 2.G., and 27-8-0, paragraph 2.B.

(13) Install access panels and close access doors.







CABLE REFERENCE	NUMBER REQUIRED	LENGTH	CABLE SIZE	FITTINGS 1	FITTINGS 2	
A	2	81.50	3/32 X 7 X 7	AN 664C3	NAS 650-S3RH	
B	1	1024	3/32 X 1 X 19	NAS 650-S3RH	NAS 650-S3LH	
C	1	1024	3/32 X 1 X 19	NAS 650-S3LH	NAS 650-S3LH	
D	1	265.70	3/32 X 7 X 7	NAS 650-S3LH	30-46631-7	
E	1	265.70	3/32 X 7 X 7	NAS 650-S3RH	30-46629-7	
F	1	174.75	3/32 X 7 X 7	22-44911-9	NAS 650-S3LH	
G	1	174.75	3/32 X 7 X 7	AN664C3	NAS 650-S3RH	
H	1	154.35	3/32 X 7 X 7	AN 664C3	30-46629-7	
I	1	153.35	3/32 X 7 X 7	22-44911-9	30-46631-7	

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CONVAIR MODEL 30

MAINTENANCE MANUAL

TEMPORARY REVISION NO. 27-67

Insert facing 27-9-0, Page 203, dated Aug. 30/61.

Page 203, in view E delete 0 to 0.30 IN. dimension between wing leading edge and slat, and replace with 0 to 0.030 IN.

Mar. 6/63
AB

WING LEADING EDGE FLAP AND SLAT CONTROL SYSTEM - DESCRIPTION AND OPERATION

(Section 27-9 applicable only to *Group I airplanes.)

1. Description

Three flaps are mounted on the lower side of each wing leading edge between the fuselage and the inboard engine. The flaps are hinged at their leading edges and are designed to hinge down and forward. The inboard flap (No. 1) is supported by three double hinges; the intermediate flap (No. 2) by two double and three single hinges; the outboard flap (No. 3) by one double and two single hinges (see Figure 1).

Four slats are mounted on the leading edge of each wing of the airplane, two located between the engine pylons and two outboard of the outboard engine pylon. Each slat is supported by two curved tracks attached to the slat structure. The tracks move fore and aft on roller supports mounted in the wing leading edge structure.

The leading edge flaps and slats are extended and retracted by torque-tube driven actuators. The torque tubes are connected through a torque-limiting gearbox to a common main drive gearbox in the airplane fuselage. The main drive gearbox is driven by two hydraulic motors. Each hydraulic motor is powered by an independent hydraulic system (see Figure 2). Flap No. 1 is driven by three actuators; flap No. 2 by two actuators; and flap No. 3 by one actuator. Each slat is driven by two actuators. Each actuator jack screw drives a recirculating ball bearing nut attached to flap or slat structure. Each actuator contains a "no-back" device to prevent air loads from extending or retracting the leading edge flaps and slats.

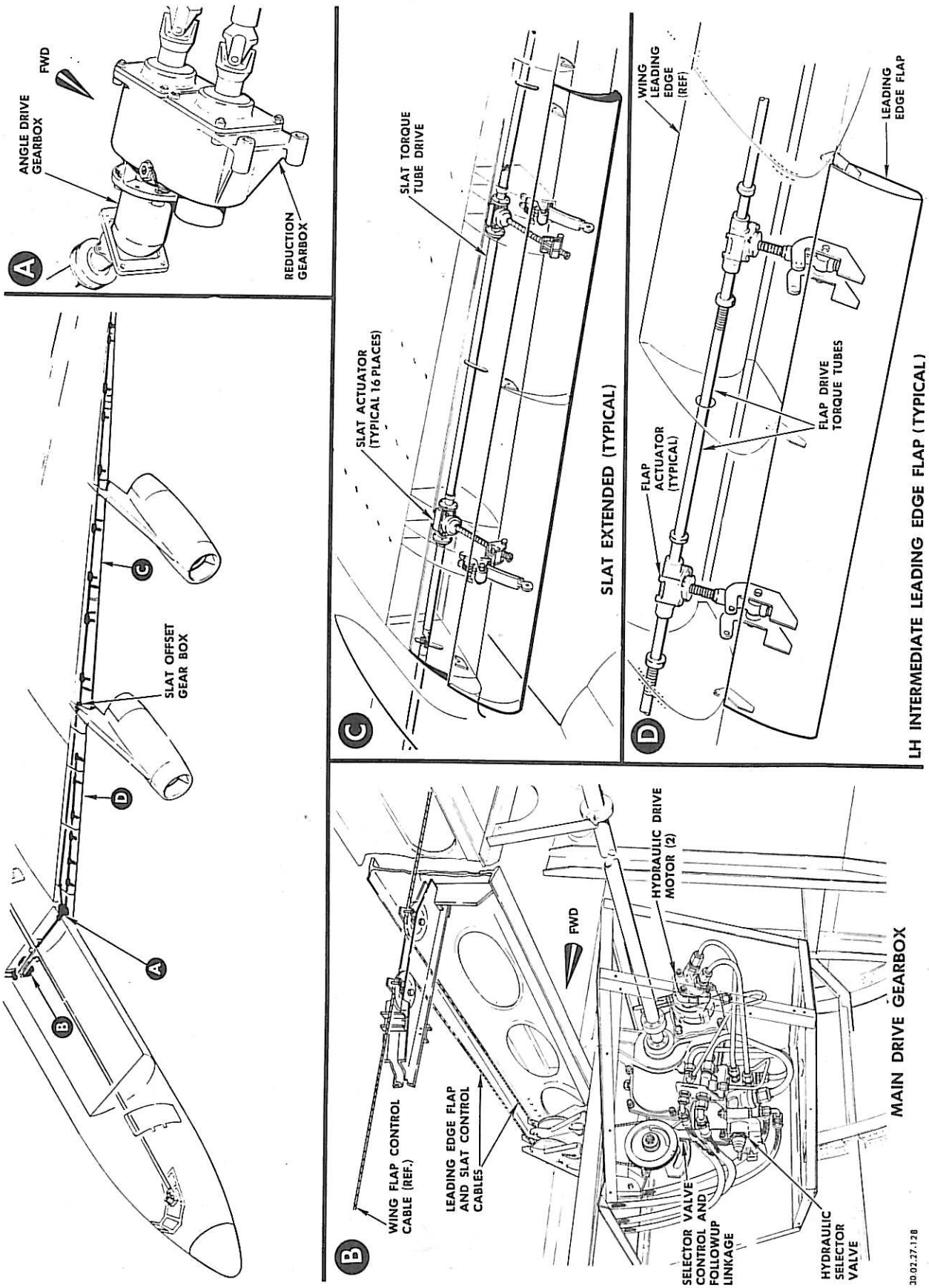
Flow of hydraulic fluid to the hydraulic motors is regulated by a dual three-way valve connected mechanically to the flap control lever on the pilots' pedestal through a loop of the same cable system that actuates the wing flaps. The valve is closed by a followup linkage when the leading edge flaps and slats reach the fully extended or retracted position. Eighty turns of the torque tubes drive the leading edge flaps to full travel of 100 degrees and slats to full travel of 15 degrees.

The position of the leading edge flaps and slats is indicated by two amber SLAT INTRANSIT and two green SLAT EXTEND lights on the copilot's instrument panel. One intransit and one extend light is provided for each wing so that each pair of lights will indicate the position of leading edge flaps and slats in one wing.

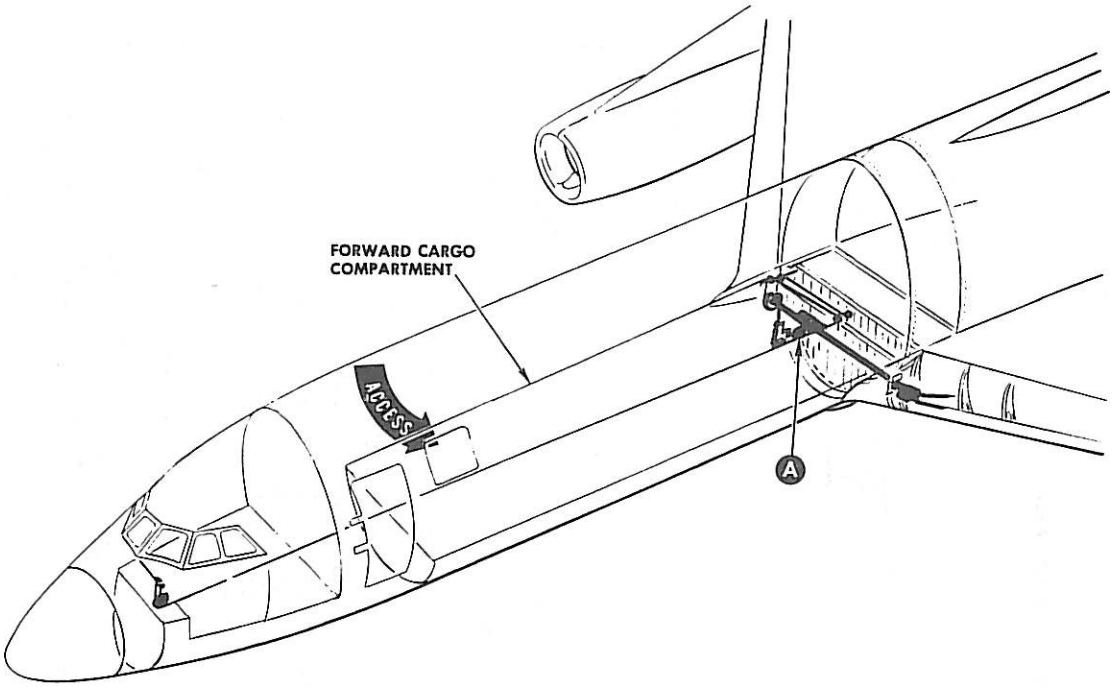
2. Operation

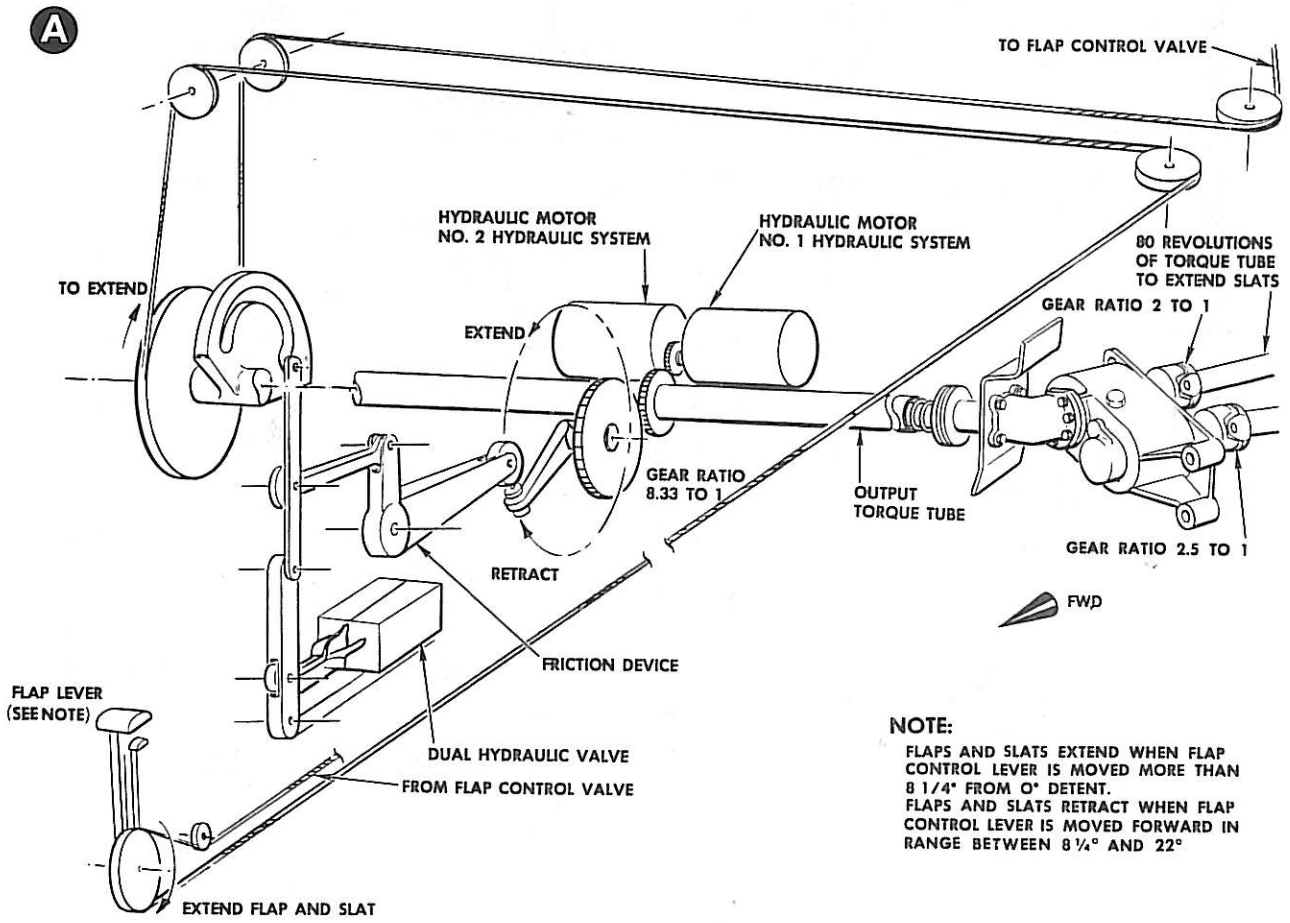
The leading edge flaps and slats are controlled through the flap control lever. When the flap control lever is moved beyond 8.25 degrees from the 0° detent, wing leading edge flaps and slats extend. The leading edge flaps and slats retract when the flap control lever is again moved toward the 0° detent. Leading edge flap and slat travel is from fully retracted to fully extended, or from extended to the retracted position. The system is instantly reversible from any position by reversing flap control lever movement.

*For group designation refer to Manual INTRODUCTION.



Wing Leading Edge Flap and Slat Control System
Figure 1





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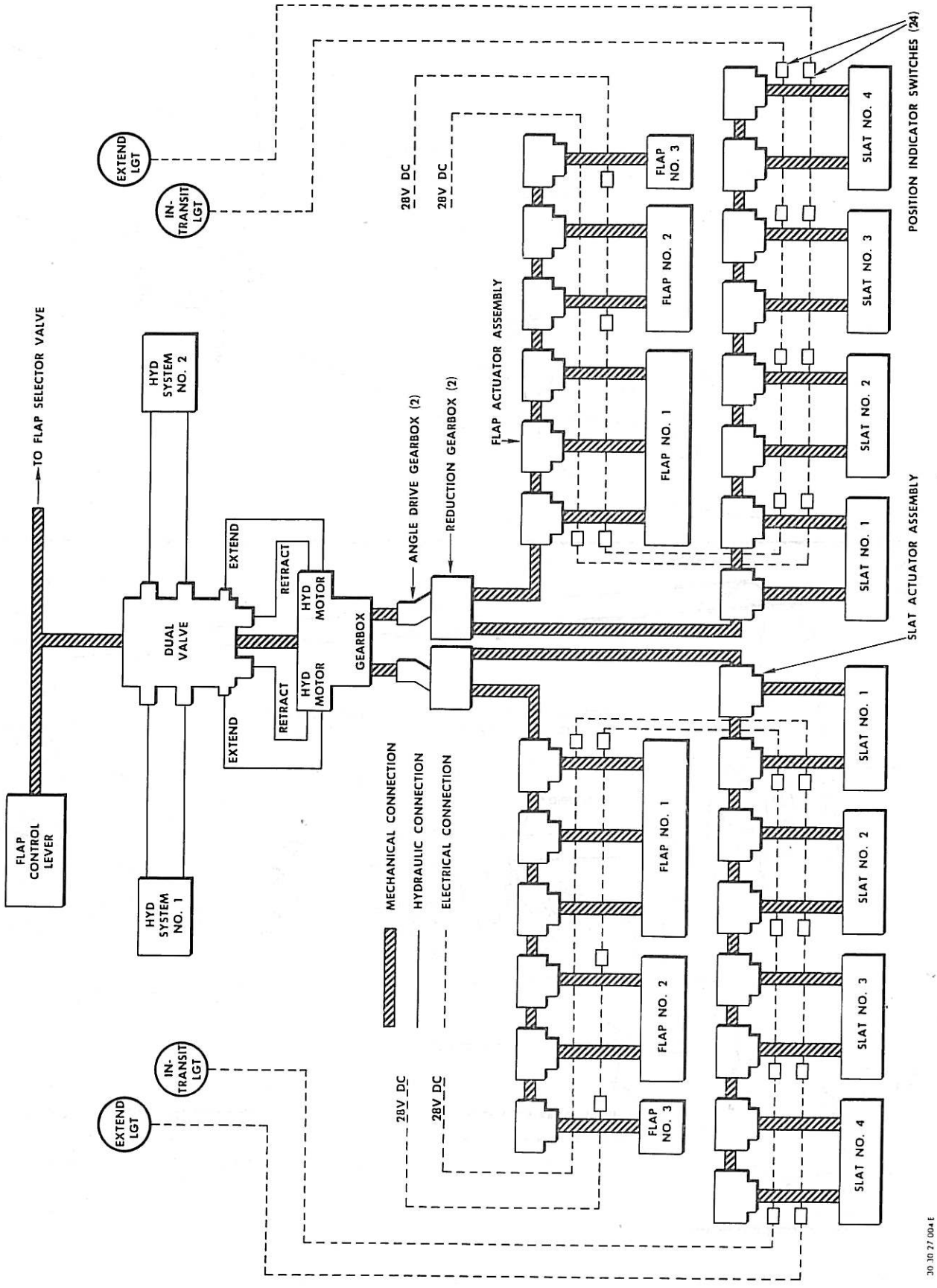
Wing Leading Edge Flap and Slat Control System Schematic
Figure 2 (Sheet 1 of 2)



Wing Leading Edge Flap
and Slat Control System Schematic
Figure 2 (Sheet 2 of 2)

3. Leading Edge Flaps and Slats

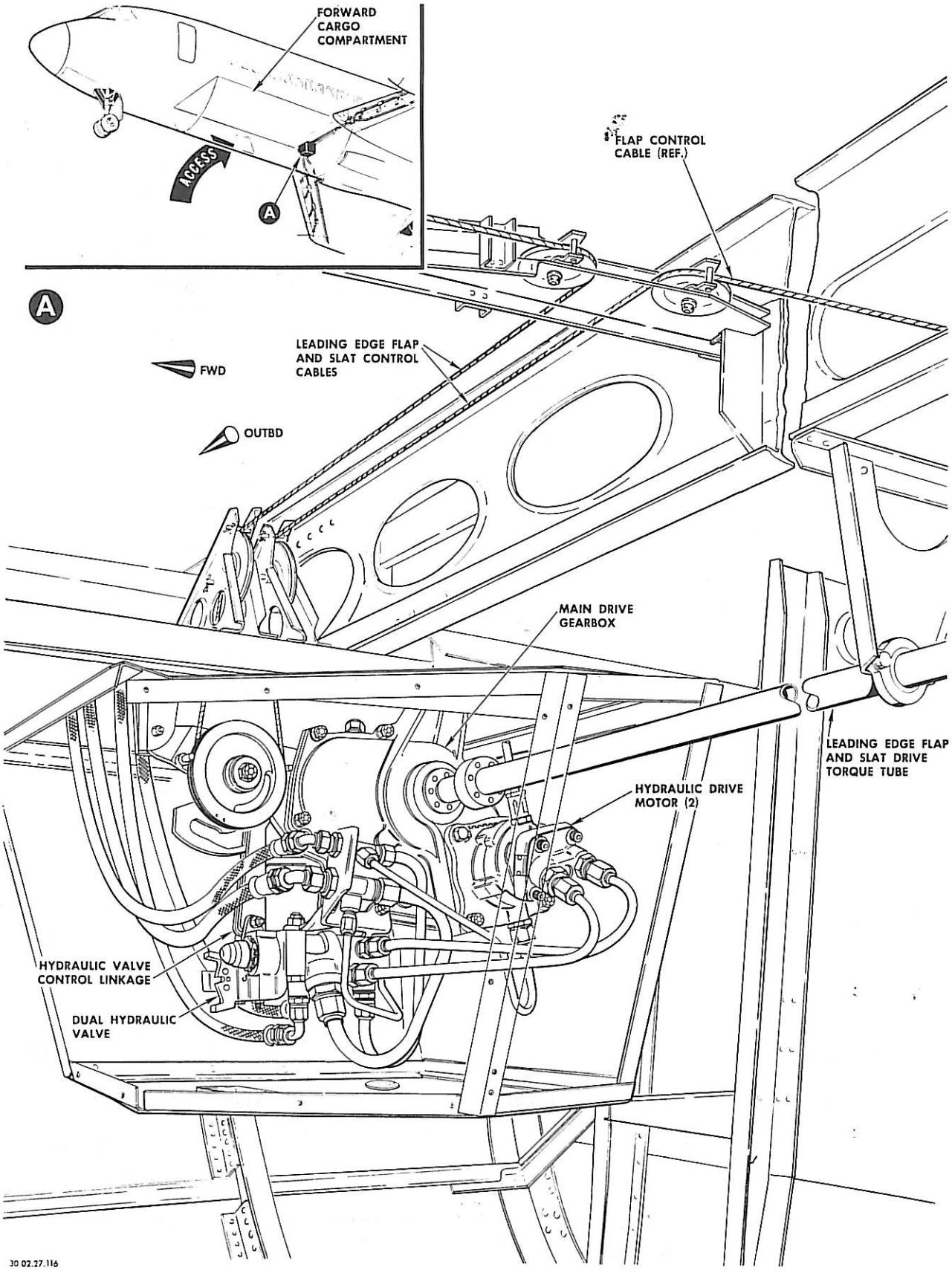
The slats are supported by tracks on roller supports attached to wing leading edge structure. The leading edge flaps are supported by hinges attached to wing leading edge structure. In the retracted position, the leading edge flaps and slats complete the contour of the wing leading edge; when extended they deflect the airflow over the upper surface of the wing permitting the airplane to fly at a higher angle of attack and lower airspeed without stalling. The leading edge of each slat is protected against icing by heated air from a telescoping tube connected to the main hot air duct in the wing leading edge. For information regarding structure of leading edge flaps and slats, refer to Chapter 57, WINGS.

4. Leading Edge Flap and Slat Main Drive Gearbox

The main drive gearbox assembly includes a drive gearbox, two hydraulic motors, a dual hydraulic control valve, and a followup mechanism consisting of followup stops, a centering spring, a followup crank, and a valve actuating arm (see Figure 3). The dual control valve regulates the flow of fluid to the hydraulic motors which drive the main drive gearbox. Each motor is powered by an independent hydraulic system. Either system will actuate the leading edge flaps and slats under all air load conditions but will not retract the leading edge flaps and slats under all icing conditions. The control valve is self-centering to the null position to eliminate extension or retraction of the flaps and slats due to mechanical failure between the flap control lever and the control valve.

The leading edge flap and slat control cable quadrant and a cam are splined to a common shaft extending from the main drive gearbox. Full travel of the flap control lever rotates quadrant and cam 120 degrees. A roller on the top of the valve actuating arm rides on the cam, the bottom of the valve actuating arm is connected to the control valve, and the center of the arm pivots on a link connected to the followup crank. Cam flats extend from 0 to 8.25 degrees and from 21.75 to 75 degrees of flap control lever travel. Between 8.25 and 21.75 degrees of flap lever travel the cam moves the top of the valve actuating arm aft to extend the leading edge flaps and slats and forward to retract them.

The lower end of the followup crank is mounted in a friction bearing which keeps the crank from turning while the connected link is serving as a pivot for the valve actuating arm. A roller in the upper end of the crank serves as a contact point for the adjustable followup stops. The followup stops are mounted on a shaft geared to the torque tube drive in the main drive gearbox and rotate through approximately 306 degrees while the main drive gearbox output shafts complete 160 revolutions. The followup stops are adjusted to contact and rotate the followup crank when leading edge flaps and slats reach their full travel limits. Rotation of the followup crank shifts the valve actuating arm and closes the control valve.



Leading Edge Flap and Slat
Main Drive Gearbox
Figure 3

When the flap control lever is moved aft to lower the flaps, the cable quadrant and cam are rotated clockwise (as seen from the inboard side of main drive gearbox). As the flap control lever moves through the 8-1/4 to 21-3/4 degree control range, the cam moves the top of the valve actuating arm aft. The valve actuating arm pivots on the followup crank link and the bottom of the valve actuating arm moves forward to open the control valve in the extend direction.

While the leading edge flaps and slats are being extended, the followup stops rotate clockwise until the extend stop contacts the top of the follow-up crank. When the leading edge flaps and slats are fully extended, the extend followup stop bears against the roller in the top of the followup crank and rotates the crank counterclockwise. The top of the valve actuating arm now acts as a pivot and the bottom of the arm is moved aft, thus moving the control valve to the neutral, or closed, position.

When the flap control lever is moved forward through the 21-3/4 to 8-1/4 degree range the control quadrant cam moves the top of the valve actuating arm forward to open the control valve in the retract direction. The follow-up stops rotate counterclockwise and close the slat control valve when the leading edge flaps and slats are fully retracted.

When the flap control lever is moved through the 8-1/4 to 21-3/4 degree control range, the bottom of the valve actuating arm travels approximately 1/2 inch. This includes 1/4 inch overtravel. The control valve opens to allow flow to the hydraulic motors and the motors drive the gearbox. The follow-up stops rotate away from the roller in the top of the followup crank. The centering spring, attached to the bottom of the followup crank, centers the followup crank; the top of the valve actuating arm acts as a pivot and the bottom of the arm is moved back 1/4 inch toward the null position. At this point the control valve is in full open position. As leading edge flaps and slats reach the end of their travel, the followup stops contact the other side of the followup crank and drive it off center. As the followup crank moves, the bottom of the valve actuating arm is again shifted toward null. When the bottom of the valve actuating arm moves 1/4 inch, the valve is in null position and the gearbox is stopped. If the flap control lever is moved back through the 8-1/4 to 21-3/4 degree control range before the leading edge flaps and slats reach the end of their travel, and before the followup crank is driven off center, the valve actuating arm pivots on the end of the followup crank link and the bottom of the valve actuating arm moves through full travel of 1/2 inch. With the followup crank centered and the control valve in full open position, full valve actuating arm travel moves the control valve from full open, through null position, to full open in the reverse direction. The direction of rotation of the leading edge flap and slat drive motors is then reversed and leading edge flaps and slats return to their starting positions

5. Leading Edge Flap and Slat Actuators

A total of 28 actuators are used to drive the leading edge flaps and slats. Three actuators are used for each No. 1 flap, two for each No. 2 flap, one for each No. 3 flap, and two for each of the eight slats. The slats are numbered from one to four starting with the inboard slat in each wing, as

with the leading edge flaps. Actuators are identified by the number of the flap or slat with which they are used. All leading edge flaps travel 100 degrees, requiring actuator travel of 6.0 inches. All slats travel 15 degrees but, due to wing profile, the linear distance that each slat must travel is different. The strokes of the actuators for each slat are as follows: No. 1 - 11.65 inches, No. 2 - 8.75 inches, No. 3 - 6.65 inches, and No. 4 - 3.92 inches.

Each actuator assembly consists of a gearbox, a jack screw, and a recirculating ball type nut (see Figure 4). Each gearbox contains a pair of bevel gears and a "no-back" device. The actuators are designed with a combination of screw pitch and bevel gear ratio to produce the desired stroke from the same number of torque tube revolutions. The "no-back" devices prevent tension or compression air loads from moving the flaps or slats.

The leading edge flap actuators are identical and interchangeable but are not interchangeable with any slat actuator. These actuators differ in stroke and in the type of recirculating ball nut used.

6. Angle Drive Gearbox

An angle drive gearbox is located in each side of the fuselage where the leading edge flap and slat drive torque tubes leave the fuselage to enter the wing leading edges (see Figure 1). Each gearbox is mounted on a pan which replaces the fuselage skin in this area and also supports the pressure seals for the engine controls. The angle drive gearbox also serves as a pressure seal for the torque tubes. A set of bevel gears in the gearbox changes the direction of the torque tubes to follow the rearward sweep of thr front wing spars.

7. Reduction Gearbox

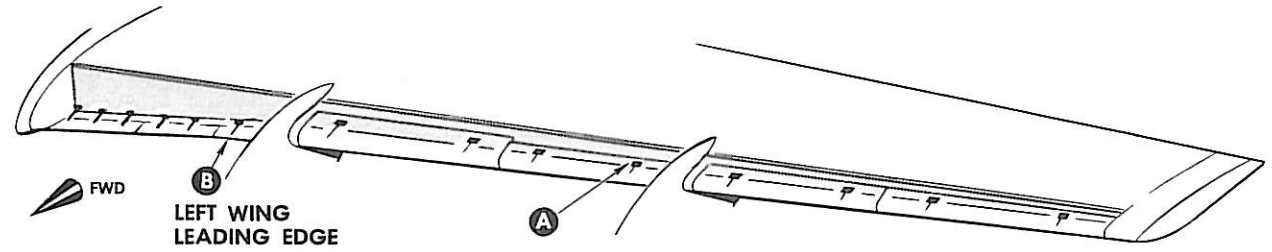
The reduction gearbox is mounted on the output side of the angle drive gearbox and contains a gear, sprocket, and chain arrangement to provide two output shafts. The gear reduction ratio of the slat output is two to one. The gear reduction of the leading edge flap output is two and one-half to one.

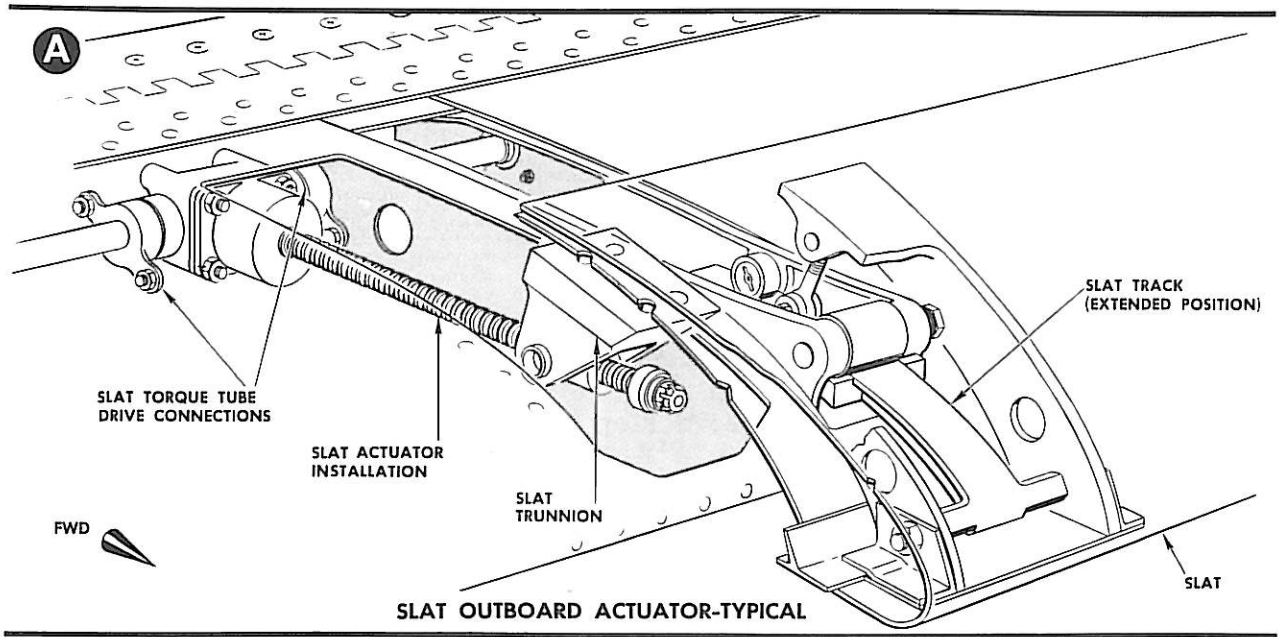
8. Slat Offset Gearbox

An offset gearbox is attached to a channel support on the front spar of each wing at the inboard side of the inboard engine pylon (see Figure 1). The torque tube drive system is offset by a set of spur gears in the gearbox to line up with the torque tube outboard of the inboard engine pylon.

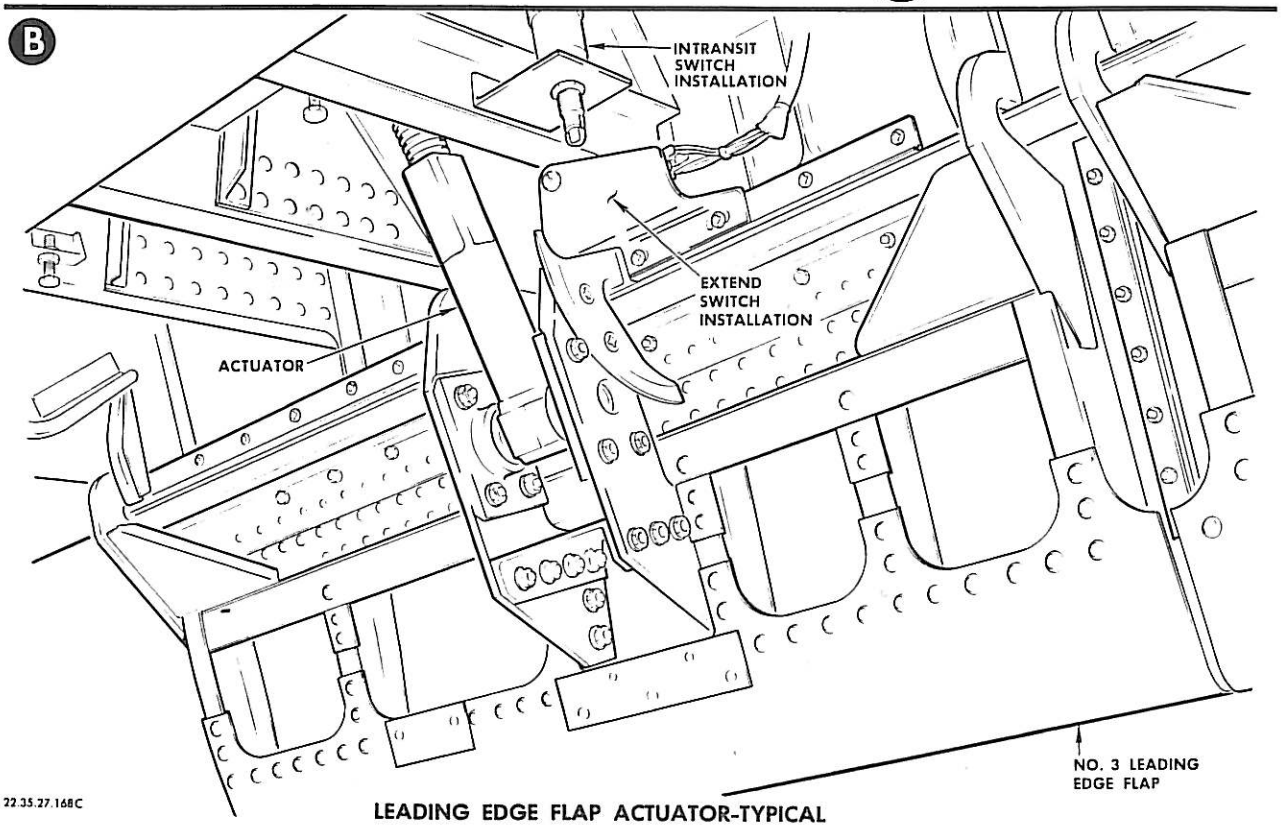
9. Torque Tube Assemblies

The torque tubes connect the main drive gearbox to the 16 slat actuators and the 12 leading edge flap actuators (see Figure 4). The torque tube sections are joined with flexible sprocket and chain couplings and splined joints. The chain couplings are couble safetied by rubber boots that hold the chain in place if a closing line should become disconnected. Compression springs hold the splined ends of the torque tubes in the serrated





SLAT OUTBOARD ACTUATOR-TYPICAL



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LEADING EDGE FLAP ACTUATOR-TYPICAL

fittings of the splined joints and compensate automatically for changes in torque tube length due to wing deflection (see figure 5).

Inboard of the inboard engine pylon, the slat drive torque tubes are mounted on the wing front spars. Access to these torque tubes is gained by raising the inboard leading edge sections. Leading edge sections inboard of the outboard engine pylon are hinged at the top.

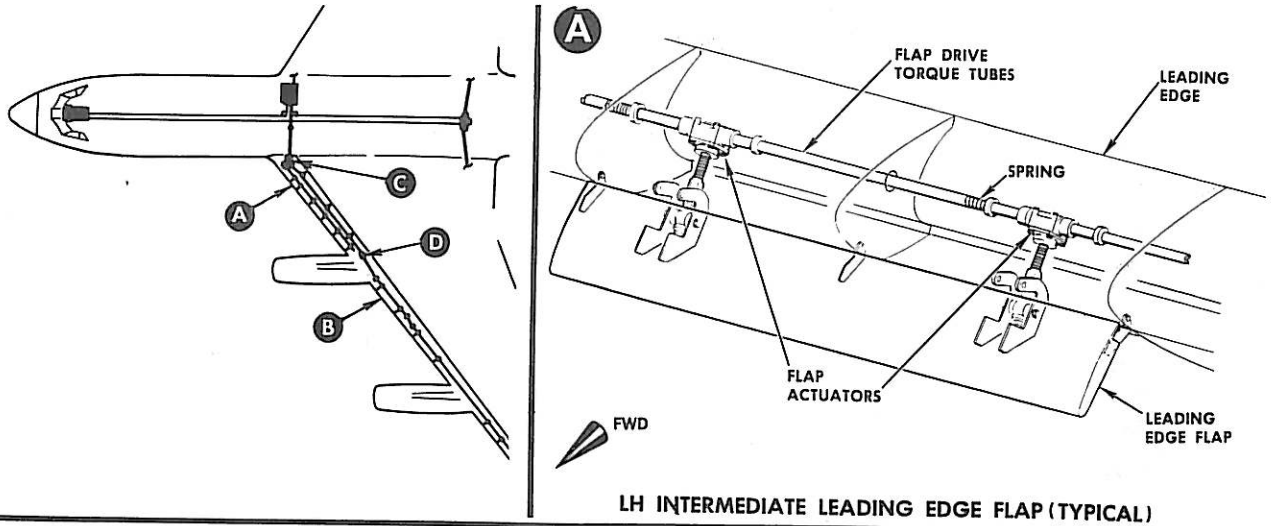
Outboard of the inboard engine pylon, slat drive torque tubes are installed in the leading edge sections. Access to these torque tubes is gained by raising the leading edge sections between the engine pylons and removing leading edge sections outboard of the outboard engine pylon.

Torque tubes must be disconnected at both ends of the leading edge section (except, at inboard end only for slat No. 4) before a leading edge section is raised or removed.

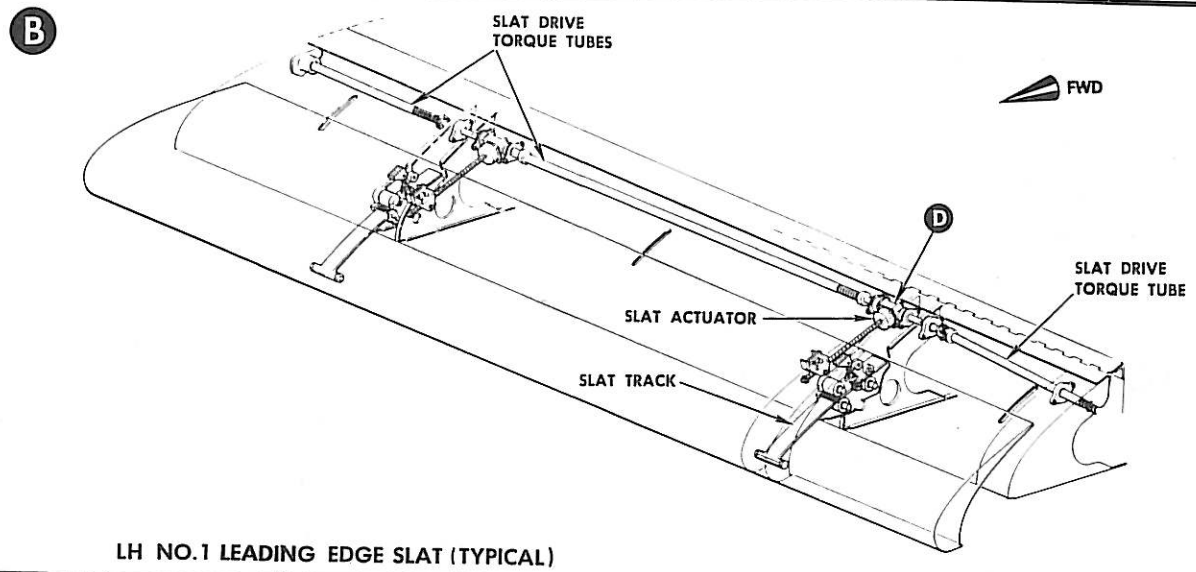
Leading edge flap drive torque tubes are installed in the inboard leading edge. Access to these torque tubes is gained by removing access panels in the No. 1 and 2 flaps and in the top of the leading edge above the outboard end of flap No. 2 and above flap No. 3.

10. Leading Edge Flap and Slat Position Lights

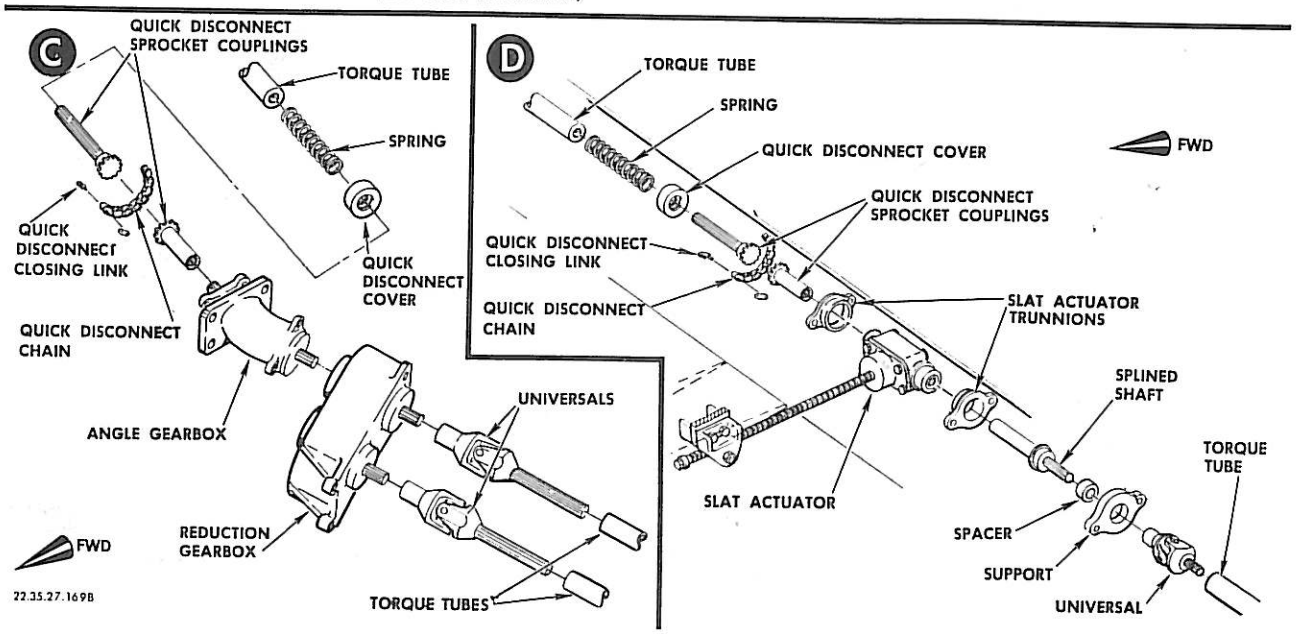
The leading edge flaps and slats have only two positions - fully extended or fully retracted. Four indicator lights on the engine instrument panel indicate the position of the leading edge flaps and slats. An amber SLAT IN TRANSIT light illuminates when any of the leading edge flaps or slats on the corresponding wing move away from the retracted position. A green SLAT EXT light illuminates when all leading edge flaps and slats on the corresponding wing are fully extended. Intransit switches are mounted on the wing leading edge ribs adjacent to the inboard actuator of each slat and at the inboard end of each leading edge flap. Intransit switches are actuated by the leading edge flap or slat in the retracted position. Extend switches are installed in the inboard track roller support of each slat to be actuated by the slat track (see Figure 4), and in the leading edge ribs at the forward-inboard corner of each leading edge outboard flap to be actuated by an actuating bracket mounted on the flap. The four slat extend switches and the single flap extend switch in each wing are connected in series with the corresponding SLAT EXT light with the result that the green light illuminates only when the outboard flap and the four slats are fully extended. Each leading edge flap and slat intransit switch and a second pole of each extend switch are connected in series to the corresponding SLAT IN TRANSIT light (see Figure 6). The pairs of switches in each wing are connected in parallel to the light with the result that the amber light illuminates as soon as any leading edge flap or slat in the wing leaves the retracted position. When the leading edge flaps and slats reach the fully extended position, the second poles of the extend switches are opened, breaking the intransit circuit and extinguishing the SLAT IN TRANSIT light.

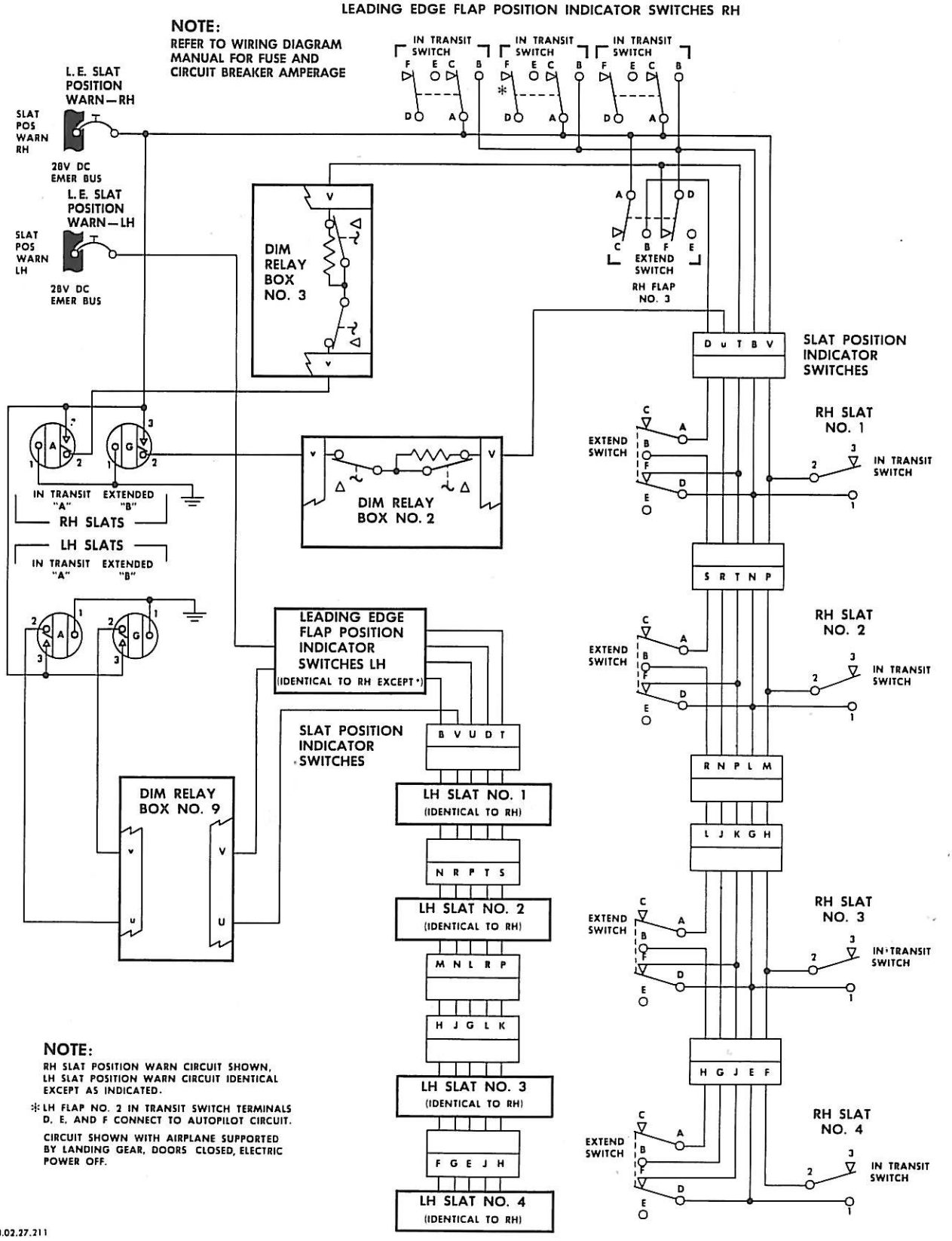


LH INTERMEDIATE LEADING EDGE FLAP (TYPICAL)



LH NO.1 LEADING EDGE SLAT (TYPICAL)





Leading Edge Flap and Slat Position Lights Schematic
Figure 6

LEADING EDGE FLAP AND SLAT CONTROL SYSTEM - TROUBLE SHOOTING

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION
1. INOPERATIVE FLAPS AND SLATS	
A. Faulty linkage between flap control lever and flap and slat control valve.	Move flap control lever on pilots' pedestal and check for proper movement of quadrant on main drive gearbox. If quadrant does not rotate approximately 121 degrees when flap control lever is moved to 50° detent, check flap and slat control rigging (refer to 27-4-0, Adjustment/Test Flap Control System Rigging Procedure, and to Leading Edge Flap and Slat Control System Rigging Procedure).
B. No hydraulic power at main drive gearbox.	Check hydraulic systems (refer to Chapter 29, HYDRAULIC POWER).
C. Disconnected torque tube.	Operate flap and slat system. If inboard leading edge flaps or slats operate and outboard flaps or slats do not, or if flaps and slats on only one side of airplane operate, check torque tubes and connect as required (refer to Removal/Installation Leading Edge Flap and Slat Drive Torque Tubes). Check offset gearboxes at inboard engine pylons to determine that power is being transmitted.
D. Main Drive gearbox inoperative.	If leading edge flaps and slats are in retracted position, make sure that rotating stop is operating against friction clutch arm. Adjust retract stop by disconnecting flap and slat drive torque tubes at reduction gearboxes and moving flap control lever to 0° detent. Adjust travel as required (refer to Adjustment/Test Adjust Leading Edge Flap and Slat Travel). If leading edge flaps and slats are extended, disconnect torque tubes at outboard side of each reduction gearbox (refer to Removal/Installation Leading Edge Flap and Slat Drive Reduction Gearbox). Operate flap control lever.

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION
1. INOPERATIVE FLAPS AND SLATS (CONT)	
	If main drive gearbox does not operate, disconnect torque tubes from gearbox output shafts (refer to Removal/Installation Leading Edge Flap and Slat Drive Torque Tubes). Operate flap control lever.
	If main drive gearbox does not operate, move flap control lever from 0^{o} to 10^{o} detent and carefully observe action of control valve followup linkage. The control quadrant (refer to Removal/Installation Main Drive Gearbox) should rotate approximately 50 degrees. The top of the valve actuating arm is driven by the cam (refer to Leading Edge Flap and Slat System - Description and Operation, Paragraph 4), the arm pivots on the forward end of the follow-up crank link, and the bottom of the arm moves forward about 1/2 inch. The rotating stops rotate clockwise, away from the top of the followup crank. Due to the action of the centering spring attached to the bottom of the followup crank, the crank tends to follow the rotating stops, however the centering spring limits this movement and the followup crank rotates only far enough to move the bottom of the valve actuating arm 1/4 inch back toward null position. As the gearbox continues to operate, rotating stops strike the forward side of the roller in the top of the followup crank and again drive the crank off center. This movement is transmitted through the crank link, to the valve actuating arm and the valve actuating arm is moved aft 1/4 inch to null position, thus shutting off hydraulic flow to the drive motors. After the initial centering movement of the followup crank, there should be no further movement of the followup linkage, except for rotation of stops, until stops again strike top of crank and drive if off center. If there is any movement of the followup crank

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION
1. INOPERATIVE FLAPS AND SLATS (CONT)	
	other than that described, replace the gearbox (refer to Removal/Installation Main Drive Gearbox). Check followup linkage for loose or missing connections. Tighten or replace connecting elements as required. Make sure that valve actuating arm roller is properly positioned in cam. Check position of nuts at ends of centering spring on outboard side of main drive gearbox. These nuts are adjusted and sealed in place with torque paint or "hold-tite" compound at overhaul. If torque paint is broken and nuts are out of adjustment, loosen nuts with flap control lever in 10° detent. Return nuts to old position if possible, or, adjust nuts to obtain leading edge flap and slat travel time of 16 (±2.0) seconds. If gearbox is still inoperative, replace main drive gearbox assembly (refer to Removal/Installation Main Drive Gearbox).
E. Leading edge flap and slat system jammed by defective angle drive or reduction drive gearbox. (See Possible Cause F; these isolation procedures may be performed simultaneously if necessary.)	Disconnect torque tube between main drive gearbox and left side of airplane. Attempt to operate leading edge flap and slat system with power from only one hydraulic system. If system does not operate, connect torque tube, remove fairing from top of right-hand wing leading edge stub, and disconnect torque tubes from outboard side of right-hand reduction drive gearbox. If system does not operate, disconnect torque tube from inboard side of angle drive gearbox. If system operates, remove reduction gearbox (refer to Removal/Installation Leading Edge Flap and Slat Reduction and Angle Gearboxes) and try system with angle gearbox connected. If system again does not operate, replace angle drive gearbox (refer to Removal/Installation Leading Edge Flap and Slat

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION
1. INOPERATIVE FLAPS AND SLATS (CONT)	
	Reduction and Angle Gearboxes). If flaps and slats operated with left side of system disconnected, isolate defective left-hand component as outlined for right side. If defective half of system was jammed in any position other than fully retracted, readjust leading edge flap and slat retraction on disconnected side as outlined in Adjustment/Test Adjust Leading Edge Flap Retraction and Adjust Slat Retraction. NOTE: If leading edge flap and slat system does operate with any part of the system disconnected, and that disconnected part of the system is not in the fully retracted position, that part of the system must be readjusted as outlined in Adjustment/Test Adjust Leading Edge Flap Retraction and Adjust Slat Retraction.
F. Leading edge flap or slat jammed by defective or disconnected actuator.	If system operates with torque tubes disconnected from outboard side of one reduction gearbox during procedures outlined in E, above, connect one torque tube and then the other to determine whether flap or slat is jammed. CAUTION: MAKE SURE THAT SLATS AND LEADING EDGE FLAPS ARE NOT EXTENDED TO MECHANICAL STOPS AT ENDS OF ACTUATOR JACK SCREWS. IF ANY PART OF THE SYSTEM IS NOT FULLY RETRACTED WHEN CONNECTED TO MAIN DRIVE GEARBOX, AND GEARBOX IS IN RETRACT POSITION, OPERATE IN RETRACT DIRECTION, OR, EXTEND VERY LITTLE AND QUICKLY RETURN FLAP CONTROL LEVER TO 0° DETENT TO PREVENT PARTIALLY EXTENDED FLAP OR SLAT CONTACTING MECHANICAL STOPS.

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION
1. INOPERATIVE FLAPS AND SLATS (CONT)	
	If defective part of system is fully retracted or extended, operate system to that position and connect torque tube at reduction gearbox. If defective part is jammed at any other position, use splined adapter at inboard end of torque tube to drive torque tube. If it is determined that leading edge flaps are jammed, proceed as follows: (1) Remove access panels from flaps No. 1, 2, and 3, and from leading edge above flap No. 3 and outboard end of flap No. 2. (2) Disconnect flap No. 3 actuator. Check operation. (3) If flaps are still jammed, disconnect torque tube at inboard end of flap No. 2. Check operation of flap No. 1. (4) If flap No. 3 is jammed, replace actuator (refer to Removal/Installation Leading Edge Flap Actuator). (5) If flap No. 1 or 2 is jammed, check torque tube connections, or disconnect individual actuators from flap and torque tube drive until defective actuator is located, then replace actuator (refer to Removal/Installation Leading Edge Flap Actuators). If it is determined that slats are jammed, proceed as follows: (1) Remove leading edge access doors from below inboard ends of jammed slats No. 1, 3, and 4. (2) Disconnect torque tube at inboard end of slat No. 4. Check operation of slats.

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION
1. INOPERATIVE FLAPS AND SLATS (CONT)	
	(3) Disconnect torque tube at inboard end of slat No. 3 and check operation.
	(4) If cause of trouble is determined to be slat No. 1 or 2, disconnect torque tube at inboard end of slat No. 1, raise both leading edge sections (refer to Chapter 57, WINGS) and disconnect torque tubes between slats No. 1 and 2 (refer to Removal/Installation Leading Edge Flap and Slat Drive Torque Tubes).
	(5) Attempt manual operation of slat No. 1 or 2.
	When jammed slat is isolated, raise or remove the applicable leading edge section (refer to Chapter 57, WINGS).
	Remove fiberglas baffles as necessary to pinpoint defect. Connect or replace torque tube as necessary (refer to Removal/Installation Leading Edge Flap and Slat Drive Torque Tubes), or replace actuator (refer to Removal/Installation Slat Actuators).
2. ERRATIC LEADING EDGE FLAP AND SLAT OPERATION	
A. Low or erratic hydraulic pressure.	Check hydraulic systems (refer to Chapter 29, HYDRAULIC POWER).
B. Loose or defective control valve followup linkage.	Check followup linkage as outlined for Trouble No. 1, Inoperative Flaps and Slats.
C. Main drive gearbox binding.	Disconnect torque tubes at outboard sides of reduction gearboxes (refer to Removal/Installation Leading Edge Flap and Slat Drive Torque Tubes). Check operation of gearbox. If operation is still erratic, replace gearbox (refer to Removal/Installation Main Drive Gearbox).

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION
2. ERRATIC LEADING EDGE FLAP AND SLAT OPERATION (CONT)	
D. Leading edge flap or slat actuator or slat track binding.	Isolate leading edge flap or slat containing binding element by procedure outlined for isolating jammed flap or slat under Trouble No. 1, Inoperative Flaps and Slats. Check slat tracks and rollers for damage or misalignment that could cause binding. Where possible, check for foreign objects jammed between track and roller. Check for structural interference with tracks and actuator ball nuts. Check leading edge flap hinges for damage that could cause binding. Check for structural interference. If it is determined that a slat actuator is cause of binding and after isolating defect to a single slat, remove fiberglass baffle from back of leading edge (refer to Removal/Installation Leading Edge Slat Actuators), disconnect torque tube between actuators, and try to drive actuators separately (proper direction of rotation is stamped on inboard end of slat or leading edge); use care to avoid breaking slat trunnion fittings. If it is determined that a leading edge flap actuator is cause of binding and after isolating defect to a single flap, disconnect torque tubes at each end of flap (refer to Removal/Installation Leading Edge Flap and Slat Drive Torque Tubes), disconnect torque tube between actuators, and try to drive actuators separately. Use care to drive actuators at same speed to avoid damage.

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION
2. ERRATIC LEADING EDGE FLAP AND SLAT OPERATION (CONT)	
	If one leading edge flap or slat actuator is completely inoperative, dismount actuator gearbox and lower the flap or slat with remaining actuator. Replace defective actuator (refer to Removal/ Installation Leading Edge Flap Actuators or Removal/Installation Leading Edge Slat Actuators).

LEADING EDGE FLAP AND SLAT CONTROL SYSTEM - MAINTENANCE PRACTICES

1. Adjustment/Test Leading Edge Flap and Slat Control System Rigging Procedure (see Figure 201)

   A. Equipment Required.

      (1) Index pin No. 22-J107-3 to insert through cable quadrant, main drive gearbox casting, and control valve followup linkage cam.

      (2) Torque wrench for torquing flap and slat drive torque tubes.

      (3) Adapter to adapt torque wrench to torque tubes.

      (4) Continuity tester for checking adjustment of position indicator switches.

      (5) Stand suitable for reaching wing leading edge.

      (6) External source of hydraulic power.

      (7) External source of electrical power.

   B. Rig Flap and Slat Controls.

      (1) Adjust flap control system (refer to 27-4-0, paragraph 1.B.).

      (2) Attempt to insert index pin No. 22-J107-3 through control quadrant on flap and slat main drive gearbox.

      (3) If index pin cannot be inserted, move flap control lever until index pin will pass through control quadrant and main drive gearbox casting.

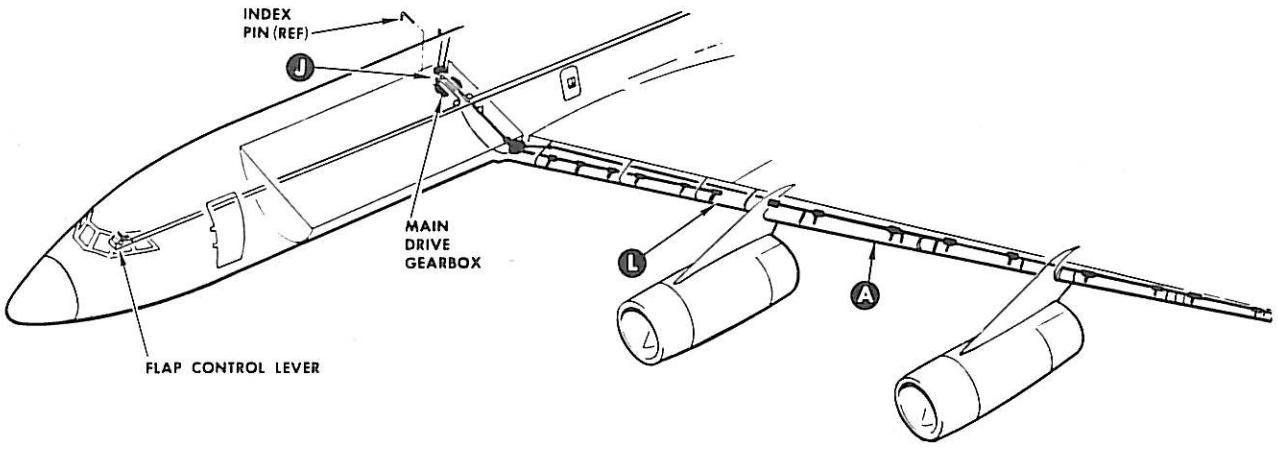
      (4) Adjust flap control cables to return flap control quadrant to the flaps "up" stop and to return the flap control lever to the 0° detent (refer to 27-4-0, paragraph 1.B.).

      (5) Remove index pin from control quadrant.

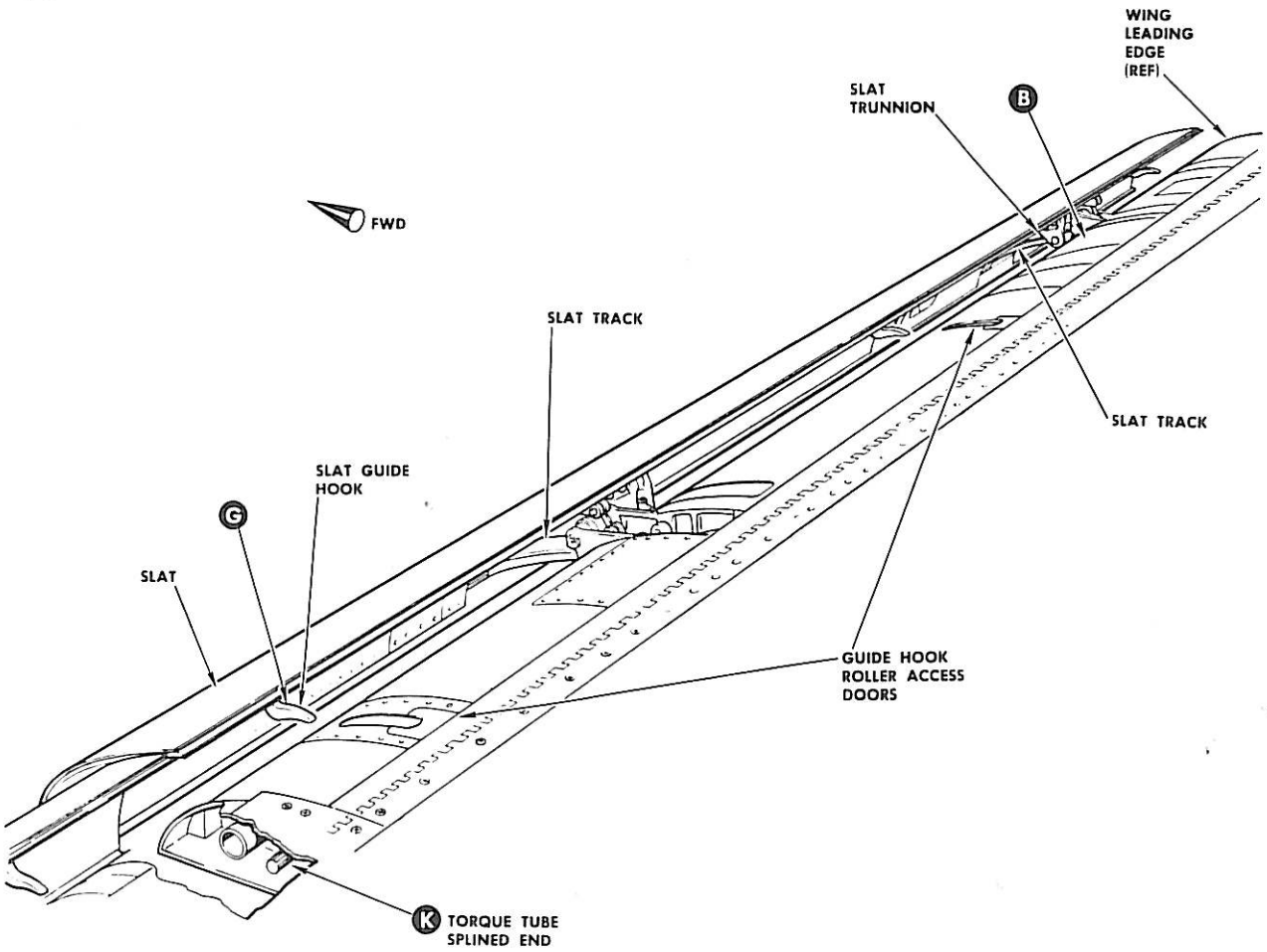
2. Adjustment/Test Leading Edge Flap and Slat Control System Adjustment

   A. Adjust Slat Tracks.

      (1) Check that No. 1 and No. 2 hydraulic systems are pressurized, that electrical power is applied to the airplane, and that the FLAP POWER SELECT switch is positioned on NORMAL # 1.



A



NO. 1 LH SLAT EXTENDED-VIEW LOOKING DOWN AND FOWARD

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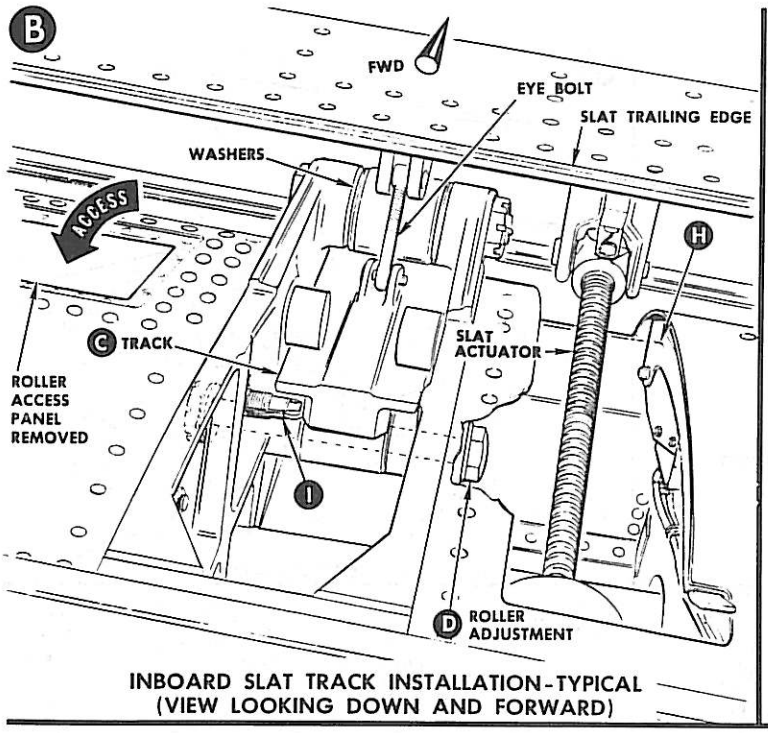
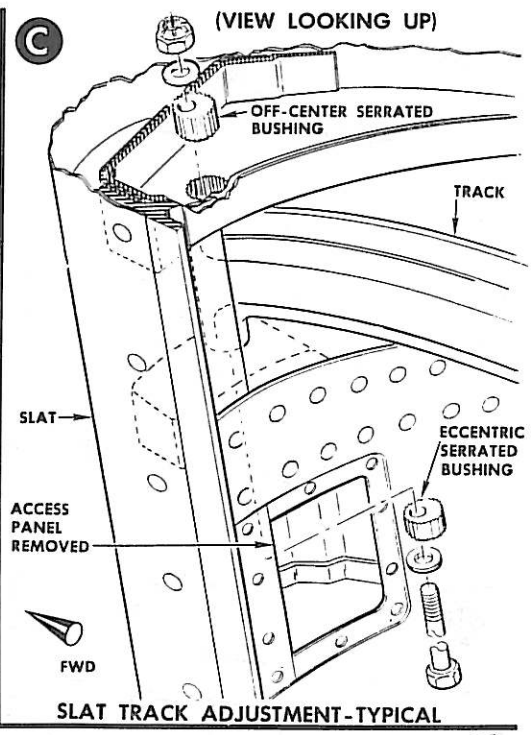
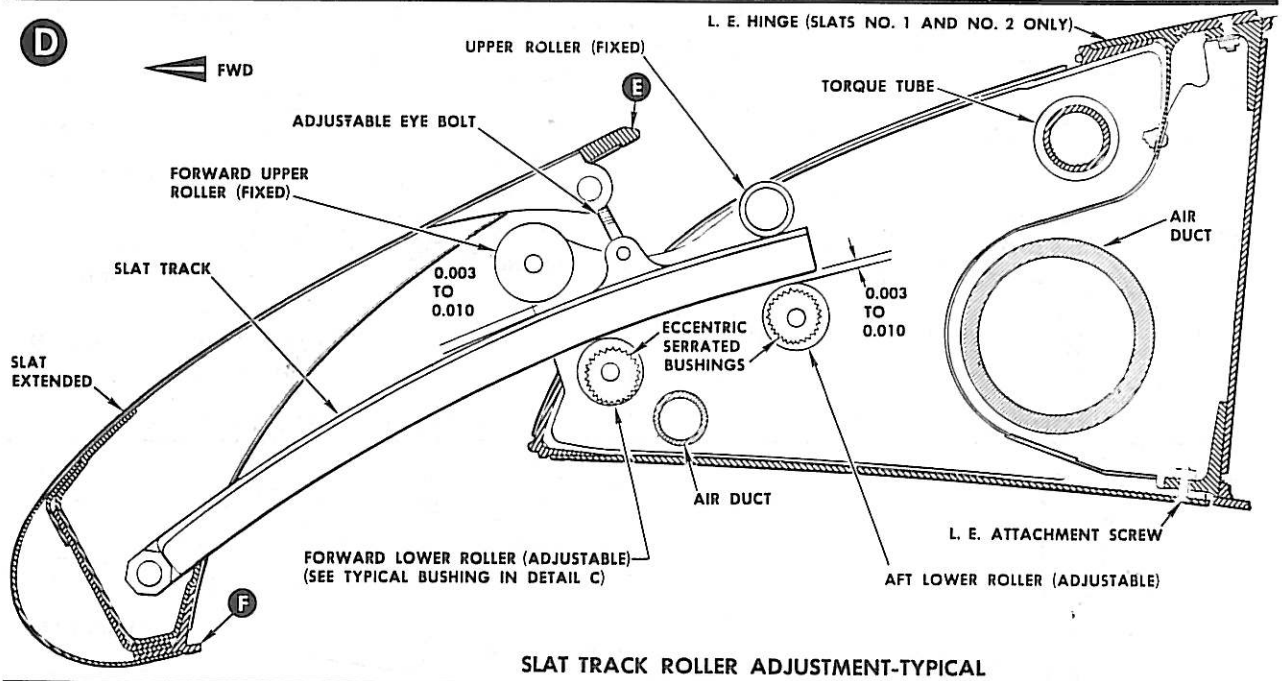


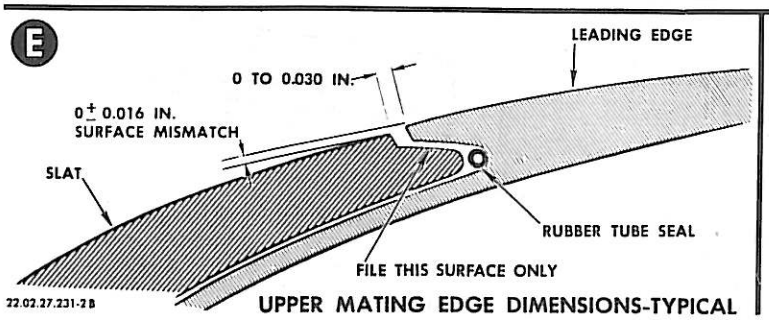
INBOARD SLAT TRACK INSTALLATION-TYPICAL
(VIEW LOOKING DOWN AND FORWARD)



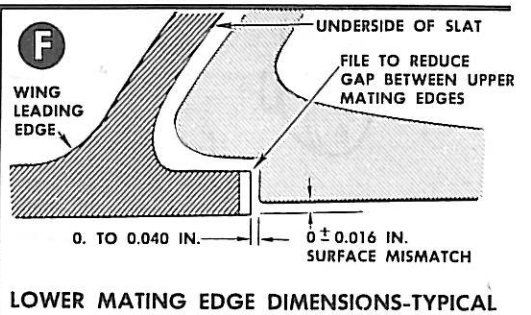
SLAT TRACK ADJUSTMENT-TYPICAL



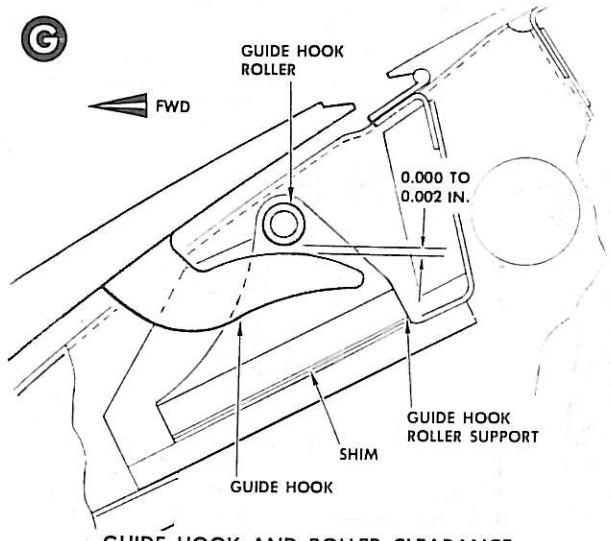
SLAT TRACK ROLLER ADJUSTMENT-TYPICAL



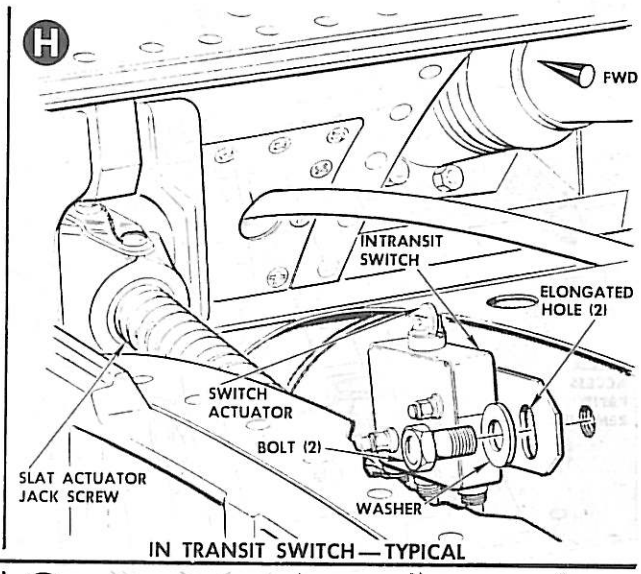
UPPER MATING EDGE DIMENSIONS-TYPICAL



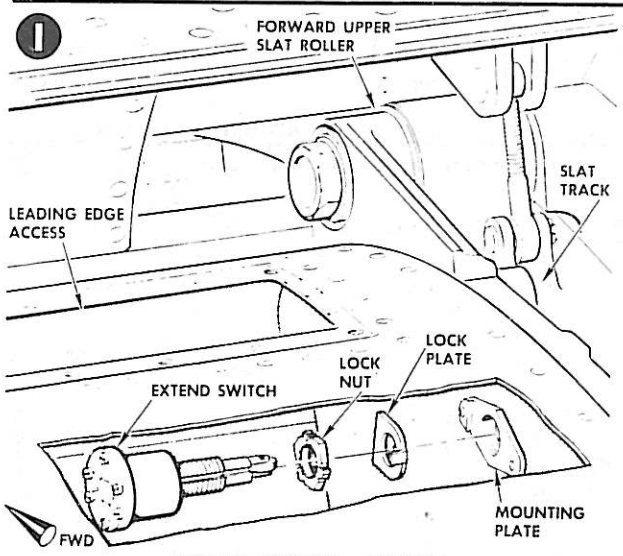
LOWER MATING EDGE DIMENSIONS-TYPICAL



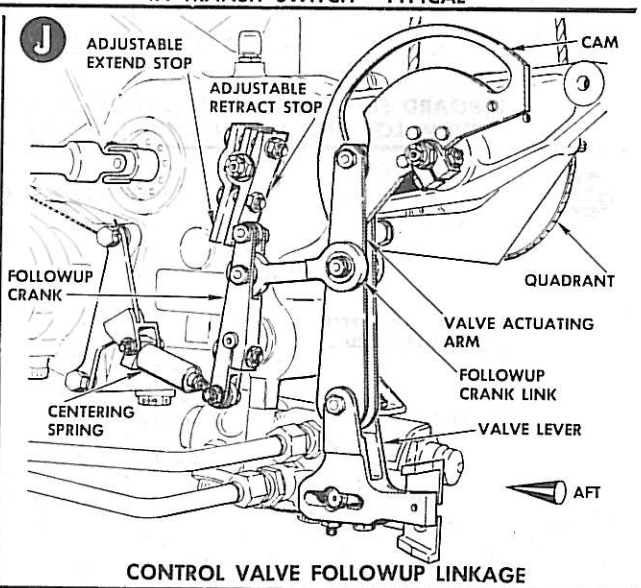
GUIDE HOOK AND ROLLER CLEARANCE



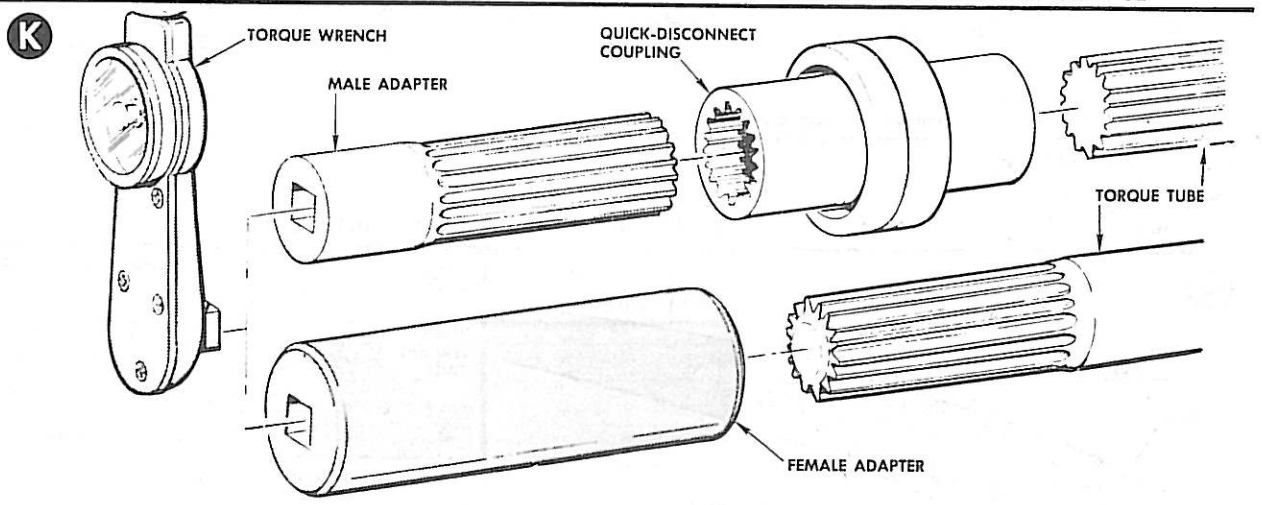
IN TRANSIT SWITCH—TYPICAL



EXTEND SWITCH—TYPICAL



CONTROL VALVE FOLLOWUP LINKAGE



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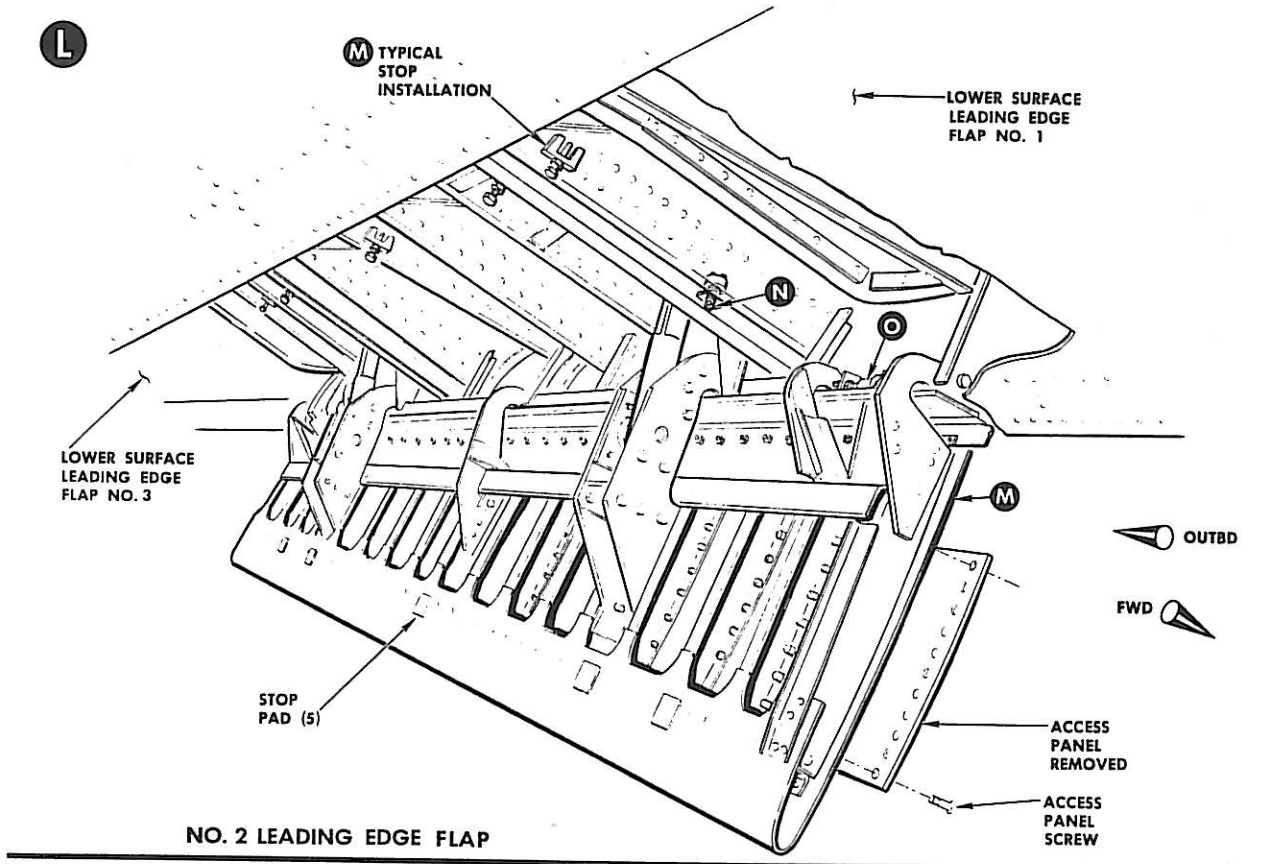
APPLICATION OF SHOP FABRICATED ADAPTERS



Leading Edge Flap and Slat Control System
Rigging and Adjustment
Figure 201 (Sheet 4 of 4)

(2) Move flap control lever to 0° detent to retract leading edge flaps and slats.

CAUTION: DO NOT OPERATE FLAPS WITH BOTH HYDRAULIC SYSTEMS PRESSURIZED UNLESS ELECTRICAL POWER IS APPLIED TO THE AIRPLANE AND THE "FLAP ASYM CONT" CIRCUIT BREAKER IS CLOSED.

(3) Check contour between wing leading edges and leading edge flaps and slats in retracted position. Mismatch between slat or flap surfaces and wing leading edge surfaces shall not exceed 0.016 inch.

NOTE: The leading edge of the leading edge flap is not adjustable, however, the seal mounted on the leading edge of the flap may be improperly adjusted, thus causing an apparent mismatch.

(4) If excessive mismatch occurs at dovetail on top of wing leading edge, proceed as follows:

(a) Move flap control lever to 10° detent to extend slats. Hang warning tag on control lever.

(b) Disconnect eyebolt at trailing edge of slat.

(c) Screw eyebolt into or out of barrel nut, as required, to obtain allowable mismatch.

(d) Connect eyebolt.

(e) Move flap control lever to 0° detent to retract slats.

(f) Check mating edges. If mismatch is still excessive, repeat steps (a) through (e) until edges are within 0.016 inch of flush.

(5) If excessive mismatch occurs at bottom of leading edge, proceed as follows:

(a) Extend slats. Hang warning tag on flap control lever.

(b) Remove access panel adjacent to forward end of slat track.

(c) Remove bolt attaching forward end of slat track to slat structure. Do not allow serrated bushings to fall free.

(d) Remove serrated bushing from each side of forward end of slat track, rotate bushings as required to obtain allowable mismatch, and install bushings. Make sure that bushings are rotated the same amount and in the same direction.

(e) Install slat track and bolt. Do not install nut and cotter pin before checking adjustment.

(f) Retract slats and check mating edges. If mismatch is still excessive, repeat steps (a) through (e) until mating edges are flush within 0.016 inch.

(g) Install nut and cotter pin on slat track bolt and install access door.

(6) If excessive mismatch occurs between leading edge and leading edge flap seal, proceed as follows:

(a) Move flap control lever to 10° detent to extend slats. Hang warning tag on flap control lever.

(b) Loosen screws in seal support angle at leading edge of flap opening in wing leading edge. Leave some screws just tight enough to hold angle in position but loose enough to allow movement when pressure is applied to seal.

(c) Move flap control lever to 0° detent to retract leading edge flaps.

(d) With flaps retracted, press seal in contour with leading edge. Snug screws in supporting angle should allow angle to move and should hold angle in place when contour is obtained.

(e) Extend leading edge flaps and slats.

(f) Tighten all screws in seal support angle.

(g) Retract flaps and slats and check leading edge contour. If seal is still too high or low repeat adjustment.

(h) Retract flaps and slats.

(7) If excessive mismatch occurs at trailing edge of leading edge flap, proceed as follows:

(a) Remove access panels from flap to be adjusted.

(b) Make sure that flap control lever is in 0° detent and disconnect torque tubes at both ends of flap. In flaps No. 1 or 2, disconnect torque tubes between actuators.

(c) Using splined adapter, operate actuators to position flap flush with leading edge surface. If necessary, thread stop bolts into leading edge rib to allow flap to rise to flush position.

(d) With flap in flush position, adjust stop bolts to contact micarta stops on top of flap.

(e) Torque each flap actuator to between 16 and 18 inch-pounds. Torque of 16 inch-pounds is preferred.

NOTE: After torquing, actuators will "unwind" approximately one-quarter turn. This is normal and acceptable. The torque-sensitive "no-back" device then engages to prevent further "unwinding".

(f) Check surface contour. If leading edge and flap surfaces are flush, check stop bolts to make sure they are properly adjusted and lock nuts tightened.

(g) Connect torque tubes. If splined ends of torque tubes do not fit easily into actuator splines, rotate torque tube in retract direction to match splines.

(h) Extend and retract leading edge flaps and slats. Check contour. If mismatch still exists, readjust as necessary to bring flap surface within 0.016 inch of flush with leading edge surface.

(i) With surface contour properly adjusted and checked, install access panels.

B. Adjust Slat Track Rollers.

(1) Remove leading edge slat track (refer to 27-9-10, Removal/Installation Leading Edge Slat Tracks). Do not disturb eyebolt adjustment on slat.

(2) Install slat track in leading edge and check clearance between track and top roller and between track and aft bottom roller. Clearance shall be not less than 0.003 inch and not more than 0.010 inch.

(3) If clearance between track and top roller is incorrect, adjust forward bottom roller. If clearance between track and aft bottom roller is incorrect, adjust aft bottom roller. Adjust rollers as follows:

(a) Remove access door adjacent to slat track in top of leading edge. For adjustment of slat No. 2 forward roller, remove a second access door from inside leading edge. This door is accessible from the top door.

(b) Remove bolt through roller and leading edge ribs. Avoid removal of serrated bushings. Note positions of washers at each end of roller.

NOTE: Serrated bushings are eccentrically drilled and are closely aligned at installation. Removal of individual bushings should be avoided so that alignment will not be lost.

(c) Slip serrated bushings out of leading edge ribs, rotate bushings as required to obtain required clearance; slip bushing back into leading edge ribs. Make sure bushings are rotated in same direction and same amount.

(d) Temporarily install roller, bolt, and track. Check clearance. If clearance is still not correct, repeat step (c) until desired clearance is obtained.

(e) Install roller. Make sure washers are properly installed on each side of roller.

(f) Recheck clearance.

(g) Install access door, or doors.

(4) Install slat track (refer to Removal/Installation Leading Edge Slat Tracks).

C. Adjust Slat Guide Hook Roller Support.

(1) Check that No. 1 and No. 2 hydraulic systems are pressurized, that electrical power is applied to the airplane, and that the FLAP POWER SELECT switch is positioned on NORMAL # 1.

CAUTION: DO NOT OPERATE FLAPS WHEN BOTH HYDRAULIC SYSTEMS ARE PRESSURIZED UNLESS ELECTRICAL POWER IS APPLIED TO THE AIRPLANE AND THE "FLAP ASYM CONT" CIRCUIT BREAKER IS CLOSED.

(2) Move flap control handle to 10° detent to extend slats.

(3) Remove slotted access door, or door slightly above slot in leading edge.

(4) Check clearance between guide hook and guide hook roller. Clearance shall not exceed 0.002 inch. Check clearance as follows:

NOTE: Guide hook is used to draw trailing edge of slat down to top of leading edge during slat retraction so that dovetail will mate properly. When slat is completely retracted, dovetail draws trailing edge of slat down so that clearance between base of guide hook and guide hook roller is increased. This clearance at base of hook is not considered during guide hook roller support adjustment.

(a) Coat guide hook roller with a grease pencil.

(b) Cover top of toe of hook with masking tape (see Figure 201).

(c) Move flap control lever to 0° detent to retract slats. Extend slats. If there is a distinct impression on masking tape, clearance is correct. If tape is torn, fit between guide hook and roller is too tight.

(5) If fit between guide hook and roller is too tight, add to total thickness of shims under guide hook roller support. Remove shim laminations to decrease excessive clearance.

(6) Recheck clearance as outlined in step (4). Repeat steps (4) and (5) until a distinct impression is obtained without tearing tape when slats are retracted.

NOTE: As noted, guide hooks are designed to assist in engagement of slat trailing edge with top of leading edge. Careful observation of slat trailing edge during slat retraction may provide some indication of fit between guide hook and guide hook roller. However, make sure that any apparent misalignment is due to guide hook roller support adjustment and not slat track adjustment before changing support adjustment.

(7) After obtaining proper guide hook roller support adjustment, install access door.

D. Adjust Slat and Flap Position Indicator Switches.

(1) Check that No. 1 and No. 2 hydraulic systems are pressurized, that electrical power is applied to the airplane, and that the FLAP POWER SELECT switch is positioned on NORMAL # 1.

CAUTION: DO NOT OPERATE THE FLAPS WHEN BOTH HYDRAULIC SYSTEMS ARE PRESSURIZED UNLESS ELECTRICAL POWER IS APPLIED TO THE AIRPLANE AND THE "FLAP ASYM CONT" CIRCUIT BREAKER IS CLOSED.

(2) Move flap control handle to 10° detent to extend slats.

(3) Adjust slat intransit switch as follows:

NOTE: A slat intransit switch is mounted on the inboard side of the leading edge rib outboard of, and adjacent to, the inboard actuator of each slat. The switch plunger extends up against a switch actuating lever which, in turn, extends through the leading edge skin. The lever is depressed by the underside of the slat in the retracted position.

(a) Loosen switch assembly mounting bolts and raise aft end of switch assembly until switch actuates.

(b) Lower switch assembly until switch just de-actuates (listen for sound of switch actuation and de-actuation). Tighten mounting bolts.

(c) Check installation. Switch plunger should be in contact with actuating lever. Aft end of actuating lever should bear against underside of leading edge skin at forward side of lever cutout. Curved end of lever shall protrude through cut-out in skin.

(d) Depress aft end of switch actuating lever from above leading edge skin. Switch actuation should be audible. Release lever. De-actuation should be audible. If actuation and de-actuation are not audible, use a continuity meter to check adjustment.

(4) Adjust slat extend switch as follows:

NOTE: A slat extend switch is mounted in the leading edge rib inboard of each slat inboard track. The switch actuating plunger extends through the rib and is actuated by the slat track.

(a) Move flap control lever aft and then forward far enough to retract slats approximately one-half inch or just enough to actuate extend switch when properly adjusted, or stop the slats by relieving hydraulic pressure at the hydraulic power unit (refer to Chapter 12, SERVICING).

(b) Remove access panel from top of leading edge and just inboard of slat inboard track.

(c) With indicator circuit wiring disconnected from extend switch, screw switch into fitting in leading edge rib until switch actuating plunger contacts side of slat track.

(d) Connect a continuity checker to switch terminals A and B and continue to screw switch into rib fitting until continuity checker indicates that switch is actuated.

(e) Disconnect continuity checker and screw switch one or two more turns into rib fitting. Align plunger roller with direction of slat track travel.

(f) Connect indicator circuit wiring and install access panel.

(5) Adjust leading edge flap intransit switch as follows:

NOTE: A flap intransit switch is installed near the inboard end of each leading edge flap. The switch plunger extends straight down and is actuated by the top of the flap as it rises to the retract position.

(a) Make sure that hydraulic systems are pressurized and that flap control lever is in 0° detent.

(b) Open LH and RH SLAT POS WARNING circuit breakers.

(c) Remove access panel from inboard end of leading edge flap.

(d) Disconnect electrical wiring from intransit switch.

(e) Adjust switch so that actuator plunger is just touching flap. Thread switch down against flap until switch actuates. If

switch actuation cannot be heard, connect a continuity checker to switch terminals A and B and adjust until checker indicates switch actuation.

(f) Disconnect continuity checker and screw switch one or two more turns down against flap with switch plunger roller at 90 degrees to flap hinge line.

(g) Connect indicator circuit wiring.

(h) Install access panel.

(6) Adjust leading edge flap extend switch as follows:

NOTE: A flap extend switch is installed in the leading edge adjacent to the inboard forward corner of each leading edge outboard flap. The switch plunger extends outboard and is actuated by a cam arm attached to the flap.

(a) Move flap control lever to 10° detent to extend leading edge flaps and slats.

(b) Check that LH and RH SLAT POS WARNING circuit breakers are open.

(c) Disconnect electrical wiring from extend switch.

(d) Back switch out so that actuating plunger is clear of cam arm, then thread switch in against top of cam until switch actuates. If actuation cannot be heard, connect a continuity checker to switch terminals A and B and adjust until checker indicates switch actuation.

(e) Disconnect continuity checker and screw switch one or two more turns against top of cam. Make sure that switch plunger roller is set at 90 degrees to straight edge of cam. In any other position roller or plunger may be broken by cam action.

(f) Connect indicator circuit wiring.

(g) Retract leading edge flaps and slats.

(7) Check operation of leading edge flap and slat position indicator switches (refer to 27-9-0, paragraph 3.H.).

(8) Return airplane to normal configuration.

E. Adjust Slat Retraction.

(1) Remove leading edge access door below inboard end of each slat.

(2) Remove short length of baffle from inside each access door.

(3) Uncouple quick-disconnect coupling at inboard end of each slat (refer to Removal/Installation Leading Edge Flap and Slat Drive Torque Tubes). If quick-disconnect between slats No. 1 and 2 is not readily accessible, raise the two leading edge sections between the inboard and outboard engines simultaneously to gain access to torque tube connection (refer to Chapter 57, WINGS).

(4) Using the splined adapter and a torque wrench at one end of each slat, apply a retracting torque at end of slat drive torque tube. Torque values shall be as follows:

NOTE: Minimum torque values are preferred.

(a) Torque slat No. 4 to at least 18 but not more than 50 inch-pounds.

(b) Torque slat No. 3 to at least 42 but not more than 76 inch-pounds.

(c) Torque slat No. 2 to at least 66 but not more than 112 inch-pounds.

(d) Torque slat No. 1 to at least 108 but not more than 168 inch-pounds.

NOTE: Torque may be decreased above minimum value to obtain desired clearance (refer to Removal/Installation Leading Edge Slats). If desired clearance is not obtained at less than maximum allowable torque, remove and refit the slat. When a torque tube is torqued to the desired value and torque wrench is removed, torque tube will "unwind" approximately one-half turn before the "no-back" arrangement in each slat actuator gearbox locks to prevent further loosening of the slat. This is normal and acceptable.

(5) Disconnect torque tubes from outboard sides of reduction gearboxes (refer to Removal/Installation Leading Edge Flap and Slat Drive Torque Tubes).

(6) Check that No. 1 and No. 2 hydraulic systems are pressurized, that electrical power is applied to the airplane, and that the FLAP POWER SELECT switch is positioned on NORMAL # 1.

CAUTION: DO NOT OPERATE THE FLAPS WHEN BOTH HYDRAULIC SYSTEMS ARE PRESSURIZED UNLESS ELECTRICAL POWER IS APPLIED TO THE AIRPLANE AND THE "FLAP ASYM CONT" CIRCUIT BREAKER IS CLOSED.

(7) Move flap control lever to 10° detent for 15 seconds and then return control lever to 0° detent. Slat main drive gearbox should return to retract position and be stopped by the adjustable retract

stop (refer to Removal/Installation Leading Edge Flap and Slat Main Drive Gearbox).

(8) Connect leading edge flap and slat torque tubes to outboard sides of reduction gearboxes; lower intermediate leading edge sections if necessary (refer to Chapter 57, WINGS), and connect all torque tube quick-disconnects. If splines of two halves of a quick-disconnect do not line up readily, rotate outboard half of quick-disconnect in retract direction to align splines.

(9) Install short baffles inside each access door and install access doors.

F. Adjust Leading Edge Flap Retraction.

(1) Make sure that flap control lever is in 0^{o} detent.

(2) Remove access panels from all leading edge flaps and from leading edges above flap No. 3 and outboard end of flap No. 2.

(3) Uncouple quick-disconnect couplings at each flap actuator (refer to Removal/Installation Leading Edge Flap and Slat Drive Torque Tubes).

(4) Using splined adapter and torque wrench, apply a retracting torque of 16 to 18 inch-pounds at each flap actuator. Minimum torque is preferred, however, minimum torque may be exceeded, if necessary, to obtain required contour. Do not exceed maximum torque of 18 inch-pounds.

NOTE: When actuator is torqued to desired value and torque wrench is removed, actuator will "unwind" approximately one-half turn before the "no-back" device in the actuator gearbox locks to prevent further loosening of the flap. This is normal and acceptable.

(5) Make sure that main drive gearbox is in retract position and is stopped by the retract stop.

(6) Connect leading edge flap drive torque tubes between main drive gearbox and each flap actuator. Connect inboard actuator first and work outboard. If torque tube does not match up easily, rotate outboard side of coupling in retract direction until coupling or splines are properly matched.

(7) Install leading edge flap access panels.

G. Adjust Leading Edge Flap and Slat Travel.

(1) Adjust hydraulic power unit to deliver zero flow and zero pressure.

(2) Move flap control lever to 10^{o} detent.

(3) Operate hydraulic power unit controls to deliver just enough pressure to aircraft systems to start leading edge flap and slat movement in the extend direction.

(4) Reduce hydraulic power unit output as much as possible without stopping flap and slat movement.

(5) Stop leading edge flap and slat movement when slat No. 1 actuator ball nuts are 1/4 to 3/8 of a jack screw revolution from end of jack screw. Stop travel by reducing hydraulic power unit output to zero pressure and flow and relieving airplane hydraulic system pressure (refer to Chapter 12, SERVICING).

CAUTION: DO NOT ALLOW BALL NUTS TO BE DRIVEN AGAINST JACK SCREW STOPS. JACK SCREWS, STOPS, OR BALL NUTS MAY BE DAMAGED IF NUTS ARE FORCED AGAINST STOP.

(6) If leading edge flap and slat travel is stopped too soon by the action of the extend stop on the main drive gearbox, position flap control lever in 10° detent and adjust stops to complete leading edge flap and slat travel. Travel will continue as stops are adjusted.

(7) If leading edge flaps and slats are extended to the desired position and are not stopped by the action of the extend stop, adjust extend stop against roller in followup crank. Adjust to shift followup crank forward until control valve is shifted to neutral position.

NOTE: Extend stop is adjusted by opening or closing stop "fingers". Leading edge flap and slat travel is limited by opening stop "fingers". "Fingers" are opened by loosening bolt at base of "fingers" and tightening bolt at other side of splined stop shaft. Travel is extended by closing "fingers"; loosening one bolt and tightening bolt at base of "fingers".

CAUTION: DO NOT OPERATE LEADING EDGE FLAPS AND SLATS BEFORE TIGHTENING CLAMPING BOLTS. STOPS MAY "JUMP" SHAFT SPLINES AND ALLOW SYSTEM TO RUN TOO FAR WITH RESULTANT DAMAGE TO SYSTEM COMPONENTS.

(8) Pressurize hydraulic systems and move flap control lever to 0° detent. Leading edge flaps and slats should retract.

(9) Extend leading edge flaps and slats under reduced pressure as outlined in steps (3) and (4). Leading edge flaps and slats must stop with ball nuts of slat No. 1 actuator 1/4 to 3/8 of a jack screw revolution from ends of jack screws. Readjust extend stop as necessary.

(10) Operate hydraulic power unit to provide 1500 psig operating pressure in airplane hydraulic systems.

(11) Operate system. Check position of slat No. 1 actuator ball nuts when slats are fully extended.

(12) Adjust hydraulic power unit output to provide normal operating pressure in both hydraulic systems. Operate leading edge flaps and slats with normal pressure in both systems. Check positions of slat No. 1 actuator ball nuts when slats are fully extended.

(13) When proper extend adjustment is obtained, perform functional test (refer to 27-9-0, paragraph 3.D.).

3. Adjustment/Test Leading Edge Flap and Slat Control System Functional Test

A. Equipment Required.

(1) Stop watch.

(2) Trailing edge flap position protractor 22-18001-901.

(3) Leading edge flap position protractor 30-13034.

(4) External source of electrical power.

(5) External source of hydraulic power.

B. Slat Travel Data.

(1) General.

Moving the flap control lever to the 10° detent extends the leading edge flaps and slats. Positioning the lever in the 0° detent retracts the slats. Leading edge flaps and slats may be stopped at any point between the fully extended or fully retracted positions by either of two methods; by relieving hydraulic pressure (refer to Chapter 12, SERVICING) when flaps and slats reach the desired point, or, by reversing the movement of the flap control lever to put control valve in null position. That is; if flap control lever is moved from 0° to 10° detent, leading edge flaps and slats start to extend. If the flap control lever is then moved back from the 10° detent to a position 15 degrees from the 0° detent, control valve should move to null position, thus stopping hydraulic flow to flap and slat drive motors. If flap control lever is moved to a position less than 15 degrees from the 0° detent, flap and slat travel will be reversed (refer to Leading Edge Flap and Slat Control System - Description and Operation). Since the 15-degree position is not marked on the pedestal, it is necessary to "feel" or "hunt" for the control valve null position.

C. Preparational Check.

(1) Clear all obstructions from area that might cause damage to leading edge flaps, slats outboard spoilers, and wing flaps while slats and leading edge flaps are being operated.

(2) Check that flap control lever is in approximate position corresponding to position of flaps.

(3) Connect external source of electrical power to airplane (refer to Chapter 24, ELECTRICAL POWER).

(4) Close FLAP ASYM CONT circuit breaker on main circuit breaker panel.

(5) Connect external source of hydraulic power to airplane and pressurize No. 1 and 2 hydraulic systems (refer to Chapter 29, HYDRAULIC POWER).

CAUTION: DO NOT OPERATE FLAPS WHEN BOTH HYDRAULIC SYSTEMS ARE PRESSURIZED UNLESS ELECTRICAL POWER IS APPLIED TO THE AIRPLANE AND THE "FLAP ASYM CONT" CIRCUIT BREAKER IS CLOSED.

(6) Check that FLAP POWER SELECT switch is positioned on NORMAL # 1.

(7) If flaps are not in "full up" position, actuate flap control lever to 0° detent and allow flaps to move to position selected.

(8) Install protractor 22-18001-901 on trailing edge of LH inboard trailing edge flap and adjust to read 0 degrees.

(9) Install protractor 30-13034 at inboard edge of LH inboard leading edge flap and adjust to read 0 degrees.

D. Slat and Leading Edge Flap Travel Checks.

(1) Move flap control lever slowly in "flaps down" direction until torque tubes that drive slats and leading edge flaps just begin to rotate; check that torque tubes begin to rotate when LH inboard trailing edge flap has reached 1.5 (±0.5) degrees.

(2) Actuate flap control lever to 10° detent and check that all leading edge flaps and slats move smoothly to "full down" position.

(3) With leading edge flaps and slats in "full down" position, check that at least one slat screw jack stop is 0.25 (±0.125, -0.000) turns (90 ±45, -0 degrees) from making contact and that remaining screw jack stops are at least 0.25 turns (90 degrees) from making contact.

(4) Check that all leading edge flap screw jack stops are at least 0.09 inch from making contact.

(5) Return flap control lever slowly to 0° detent and check that all slats and leading edge flaps retract, that all slat trailing edges mate smoothly with dove-tails on wing leading edges, and that all leading edge flap surface stop bolts make contact with stop pads located on interior surface of leading edge flaps.

E. Timing Checks.

(1) Move flap control lever rapidly from 0° detent to 50° detent.

(2) Using stop watch, check that time required for slats and leading edge flaps to move from "full up" to "full down" position is 16 (±2.0) seconds.

(3) Move flap control lever rapidly from 50° detent to 0° detent and check that time required for slats and leading edge flaps to move from "full down" to "full up" position is 16 (±2.0) seconds.

F. Followup Mechanism Check.

(1) Actuate flap control lever in "flaps down" direction. When slats and leading edge flaps have extended to approximately half travel position, return flap control lever rapidly to 0° detent and check that slats and leading edge flaps return smoothly to "full up" position.

(2) Actuate flap control lever to 50° detent and allow flaps to move to position selected.

(3) Actuate flap control lever in "flaps up" direction. When slats and leading edge flaps have retracted to approximately half travel position, return flap control lever rapidly to 50° detent and check that slats and leading edge flaps return smoothly to "full down" position.

(4) Return flap control lever to 0° detent and allow flaps to move to "full up" position.

G. Test Single Hydraulic System Operation.

(1) Reduce pressure in No. 2 hydraulic system to 0 psig (refer to Chapter 12, SERVICING).

(2) Actuate flap control lever to 50° detent and check that slats and leading edge flaps move smoothly to "full down" position.

(3) Actuate flap control lever to 0° detent and check that slats and leading edge flaps move slowly to "full up" position.

(4) Pressurize No. 2 hydraulic system and reduce pressure in No. 1 hydraulic system to 0 psig (refer to Chapter 12, SERVICING).

(5) Actuate flap control lever to 10° detent and check that slats and leading edge flaps move smoothly to "full down" position.

NOTE: Wing flaps will not move as FLAP POWER SELECT switch is positioned on NORMAL # 1. Do not actuate FLAP POWER SELECT switch to ALTERNATE # 2 position.

(6) Return flap control lever to 0° detent and check that slats and leading edge flaps move smoothly to "full up" position.

(7) When single system operation is satisfactory, pressurize No. 1 hydraulic system (refer to Chapter 29, HYDRAULIC POWER).

(8) Bleed No. 1 hydraulic system (refer to Adjustment/Test Flap Control System Bleeding Procedure).

H. Slats Position Lights Check.

(1) Close RH and LH SLAT POS WARN circuit breakers on main circuit breaker panel.

(2) Actuate flap control lever from 0° to 50° detent and check that RH and LH SLATS IN TRANSIT lights illuminate when slats begin to move and that RH and LH SLATS IN TRANSIT lights extinguish and RH and LH SLATS EXTENDED lights illuminate when leading edge flaps reach 94 (±4.0) degrees.

(3) Momentarily actuate each slat extended switch on RH slats and check that RH SLATS IN TRANSIT light illuminates and RH SLATS EXTENDED light extinguishes when each RH slat extended switch is actuated and that RH SLATS IN TRANSIT light extinguishes and RH SLATS EXTENDED light illuminates when each RH slat extended switch is released.

(4) Repeat step (3) substituting LH for RH.

(5) Actuate flap control lever to 0° detent and check that RH and LH SLATS EXTENDED light extinguish and RH and LH SLATS IN TRANSIT lights illuminate when leading edge flaps reach 94 (±4.0) degrees.

(6) When slats reach "full up" position, check that RH and LH SLATS IN TRANSIT lights extinguish and RH and LH SLATS EXTENDED lights remain extinguished.

I. Conclusion.

(1) When all tests are satisfactory, remove all test equipment and return airplane to normal configuration.

WING LEADING EDGE FLAPS - MAINTENANCE PRACTICES

1. Removal/Installation Wing Leading Edge Flaps (see Figure 201)

A. Equipment Required.

(1) Stand suitable for reaching wing leading edges.

(2) Splined male adapter for adapting torque wrench to flap drive torque tubes or flap actuator gearboxes.

(3) External electric power source.

(4) External hydraulic power source.

B. General.

The three leading edge flaps on each wing are similar except for size, number of actuators, hinges, and number of hinges used. Removal and installation instructions given in paragraph C and D apply to any leading edge flap.

C. Remove Leading Edge Flap.

(1) Connect external source of electrical power (refer to Chapter 24, ELECTRICAL POWER).

(2) Connect external source of hydraulic power to airplane and pressurize No. 1 and 2 hydraulic systems (refer to Chapter 29, HYDRAULIC POWER).

CAUTION: DO NOT OPERATE FLAPS WITH BOTH HYDRAULIC SYSTEMS PRESSURIZED UNLESS ELECTRICAL POWER IS APPLIED TO THE AIRPLANE AND THE "FLAP ASYM CONT" CIRCUIT BREAKER IS CLOSED.

(3) Close FLAP ASYM CONT circuit breaker on main circuit breaker panel.

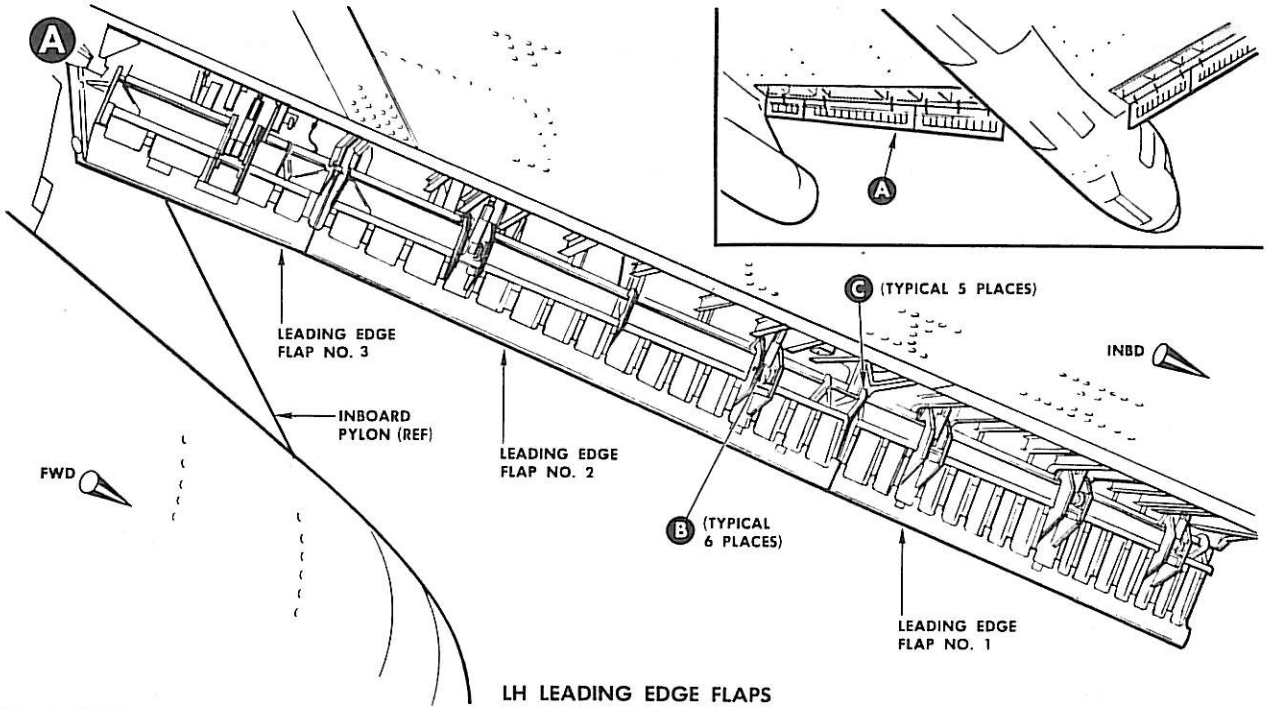
(4) Position FLAP POWER SELECT switch on NORMAL # 1, actuate flap control lever to 10° detent, and extend leading edge flaps and slats.

(5) Depressurize hydraulic system (refer to Chapter 12, SERVICING).

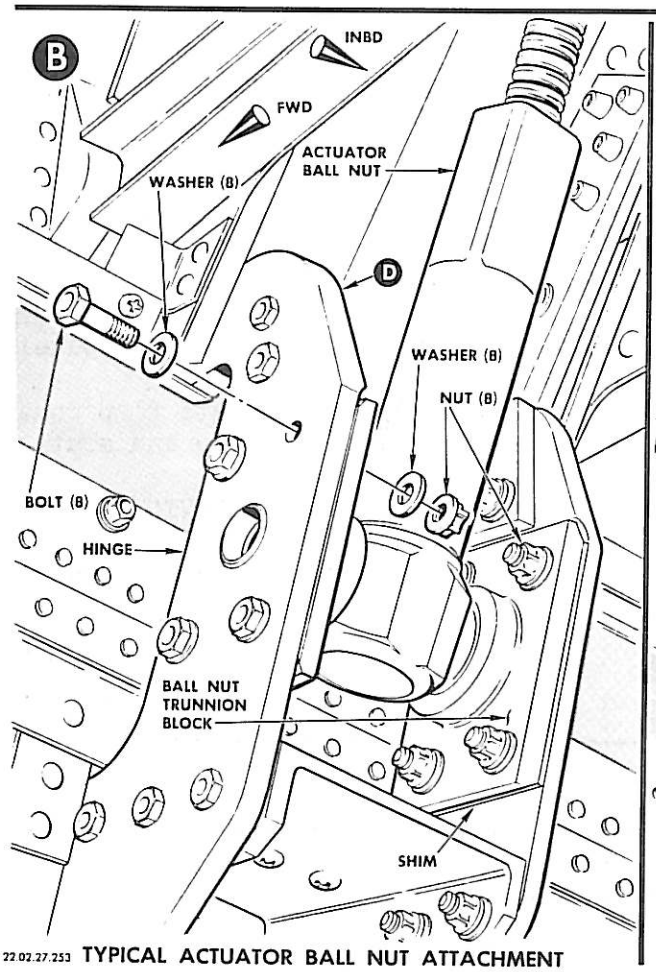
(6) If leading edge flap system is inoperable, remove all access panels in or above flap to be removed.

(7) Remove eight bolts attaching each pair of actuator ball nut trunnions to flap. Swing ball nut up against leading edge and tie in place with masking tape, string, or soft lockwire, to prevent rotation of ball nut.

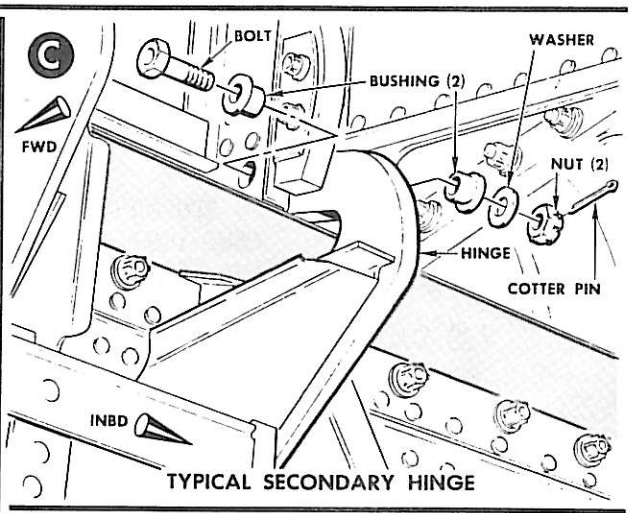
NOTE: If ball nut is allowed to rotate when disconnected from flap, flap retraction must be readjusted when actuator is again connected to flap (refer to 27-9-0, paragraph 2.F.).



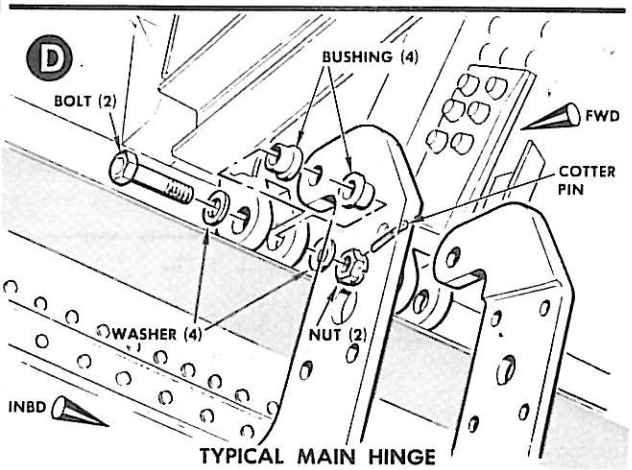
LH LEADING EDGE FLAPS



22.02.27.253 TYPICAL ACTUATOR BALL NUT ATTACHMENT



TYPICAL SECONDARY HINGE



TYPICAL MAIN HINGE

LEADING EDGE SLATS NO. 1 AND 2 - MAINTENANCE PRACTICES

1. Removal/Installation Leading Edge Slats No. 1 and 2 (see Figure 201)

A. Equipment Required.

(1) Stand suitable for reaching wing leading edge.

(2) Supporting fixtures suitable for maintaining the wing leading edge in the raised position.

(3) Splined male adapter for adapting torque wrench to slat drive torque tubes.

(4) External source of electrical power.

(5) External source of hydraulic power.

(6) Torque wrench.

B. Remove leading edge Slat No. 1 or 2.

(1) Connect external source of electrical power (refer to Chapter 24, ELECTRICAL POWER).

(2) Close FLAP ASYM CONT circuit breaker and open RH or LH WING SKIN TEMP OVERHEAT circuit breaker on main circuit breaker panel.

(3) Connect external source of hydraulic power to airplane and pressurize No. 1 and 2 hydraulic systems (refer to Chapter 29, HYDRAULIC POWER).

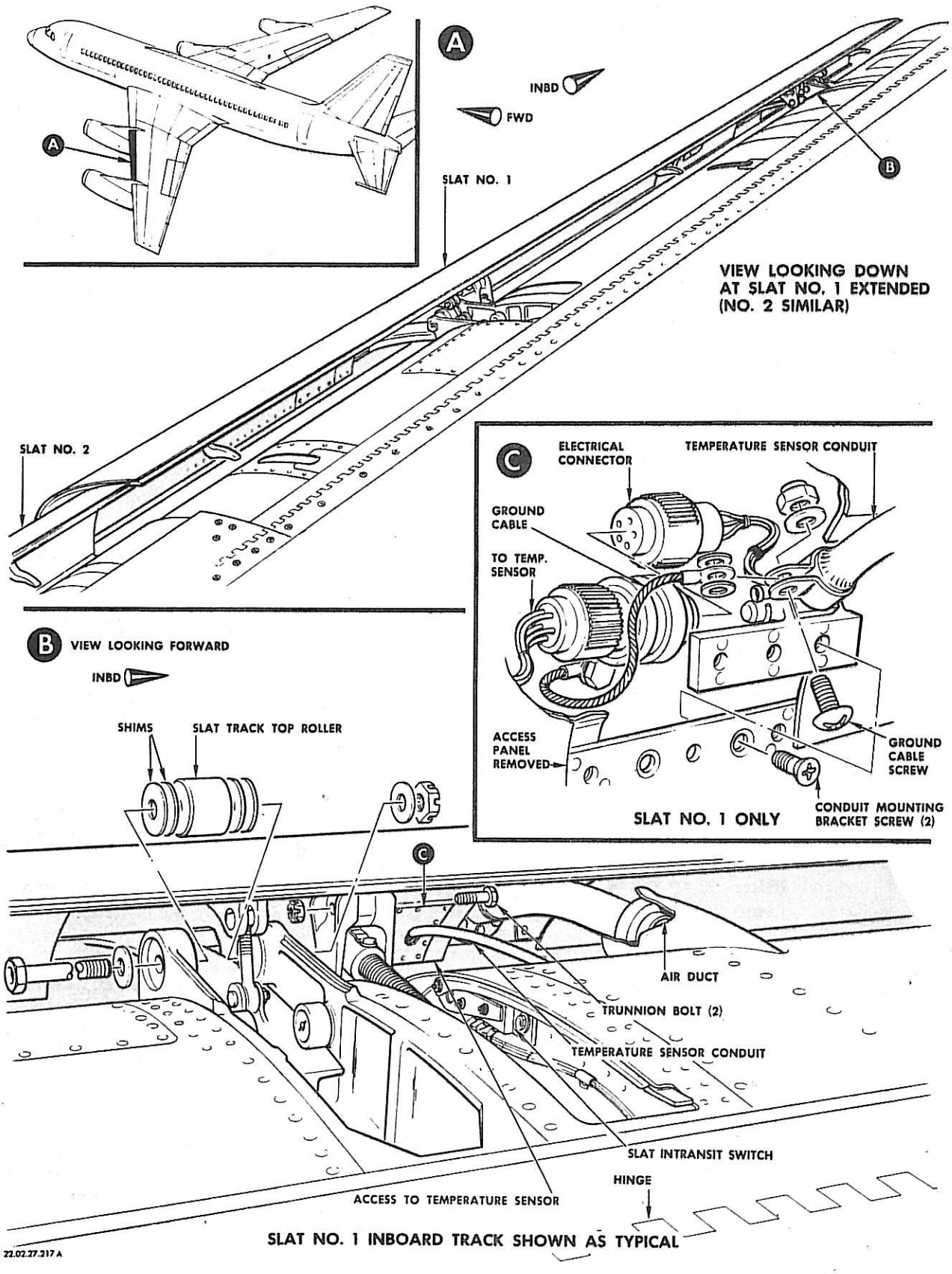
CAUTION: DO NOT OPERATE FLAPS WITH BOTH HYDRAULIC SYSTEMS PRESSURIZED UNLESS ELECTRICAL POWER IS APPLIED TO THE AIRPLANE AND THE "FLAP ASYM CONT" CIRCUIT BREAKER IS CLOSED.

(4) Place FLAP POWER SELECT switch in NORMAL # 1 position and actuate flap control lever to 10° detent to extend leading edge flaps and slats.

(5) Depressurize hydraulic systems (refer to Chapter 12, SERVICING).

(6) If removing slat No. 1, remove temperature sensor access panel from underside of slat (refer to Chapter 30, ICE AND RAIN PROTECTION). Disconnect sensor conduit from slat and uncouple sensor circuit quick-disconnect.

(7) Remove four screws attaching each slat to slat trunnion. Wrap each trunnion and jack screw with masking tape to prevent rotation of ball nuts. Allow slat to roll down against slat track top roller.


A
INBD
FWD
SLAT NO. 1
SLAT NO. 2
B
VIEW LOOKING DOWN AT SLAT NO. 1 EXTENDED (NO. 2 SIMILAR)
C
ELECTRICAL CONNECTOR
TEMPERATURE SENSOR CONDUIT
GROUND CABLE
TO TEMP. SENSOR
ACCESS PANEL REMOVED
GROUND CABLE SCREW
CONDUIT MOUNTING BRACKET SCREW (2)
SLAT NO. 1 ONLY
B VIEW LOOKING FORWARD
INBD
SHIMS
SLAT TRACK TOP ROLLER
AIR DUCT
TRUNNION BOLT (2)
TEMPERATURE SENSOR CONDUIT
SLAT INTRANSIT SWITCH
HINGE
ACCESS TO TEMPERATURE SENSOR
SLAT NO. 1 INBOARD TRACK SHOWN AS TYPICAL
22.02.27.317 A

(8) Remove two hinge bolts attaching each main hinge to leading edge. For flaps No. 2 and No. 3, remove one hinge bolt for each secondary hinge. Do not remove bushings.

CAUTION: MAKE SURE THAT FLAP IS PROPERLY SUPPORTED WHILE REMOVING HINGE BOLTS.

(9) Remove flap.

D. Install Leading Edge Flap.

(1) Check flap hinge bolt bushings in leading edge hinge lugs; all bushings should be installed with bushing flanges firmly seated against lugs. Press flanges against lugs if necessary.

(2) Position leading edge flap in leading edge opening and install two hinge bolts in each main hinge. For flaps No. 2 and No. 3, install one bolt for each secondary hinge. Install support spacers between each leg of main hinge and leading edge hinge lugs before tightening hinge bolts. Tighten hinge bolts to press bushings against bearings in hinge bolts.

CAUTION: USE CARE WHEN MOUNTING FLAP TO AVOID DAMAGE TO PLUNGERS OF LIMIT SWITCHES MOUNTED IN LEADING EDGE FORWARD OF LEADING EDGE FLAP.

(3) Remove masking tape or lockwire used to prevent rotation of actuator ball nuts, position ball nuts between flap ribs, and install eight mounting bolts for each ball nut; four bolts for each trunnion.

(4) Pressurize airplane hydraulic systems (refer to Chapter 29, HYDRAULIC POWER) and move flap control lever to 0° detent.

(5) Check mismatch between leading edge and flap, and adjust stops as required; refer to 27-9-0, steps 2.B.(6) and 2.B.(7).

(6) Check adjustment of flap position indicator switches and adjust as required; refer to 27-9-0, steps 2.D.(5) and 2.D.(6).

(7) Move flap control lever to 10° detent and back to 0° detent. Check operation of leading edge flaps and slats and of leading edge flap and slat position indicator system (refer to 27-9-0, Adjustment/Test Leading Edge Flap and Slat Control System Functional Test).

NOTE: If a leading edge flap only has been replaced and no other rigging or adjustment has been changed, check leading edge flap and slat control system operation per 27-9-0, steps 3.D.(1), 3.D.(2), 3.D.(4), and 3.D.(5), and paragraphs 3.E. and 3.H.

(8) Relieve hydraulic system pressure (refer to Chapter 12, SERVICING), install access panels, and return airplane to normal configuration.

NOTE: If ball nut is allowed to rotate on jack screw, readjustment will be required when slat is installed.

(8) Support slat and remove slat track top rollers. Remove slat.

CAUTION: MAKE SURE THAT SLAT IS SUFFICIENTLY SUPPORTED WHEN TOP ROLLERS ARE REMOVED. THERE ARE NO OTHER RETAINING ELEMENTS TO KEEP THE SLAT FROM FALLING OFF. WHEN REMOVING SLAT NO. 2, USE CARE TO AVOID DAMAGE TO SEAL ON INBOARD END OF SLAT.

C. Fit Leading Edge Slat No. 1 or 2 to Leading Edge.

NOTE: If the original slat is being reinstalled on the leading edge, fitting will normally not be required. New slats must be fitted before installation.

(1) Pressurize airplane's No. 1 and No. 2 hydraulic systems (refer to Chapter 29, HYDRAULIC POWER).

(2) While holding trunnion blocks of removed slat clear of leading edge skin, move flap control lever to 0° detent. This will retract slat trunnion blocks to prevent interference while fitting new slat. Relieve hydraulic pressure (refer to Chapter 12, SERVICING).

(3) Remove accesses at inboard end of slat No. 1 leading edge and at outboard end of slat No. 2 leading edge, disconnect torque tubes (refer to Removal/Installation Leading Edge Flap and Slat Drive Torque Tubes), bleed air ducts, etc, and raise both sections of leading edge simultaneously (refer to Chapter 57, WINGS).

(4) Disconnect bleed air duct, torque tube, and wiring and remove short baffle at break between the two leading edge sections. Lower the leading edge section to which a new slat is to be fitted. Support the other leading edge section in the raised position.

NOTE: Steps (3) and (4) are intended only to provide convenient access to slat drive torque tubes; however, it may be possible to disconnect torque tubes as in step (3) and use a drill motor with a "snake" or 90° angle drive to drive torque tubes. If proper care is taken, slats No. 1 and No. 2 may be operated together while fitting a new slat. Steps (5), (6), and (7) should be accomplished for convenience and to prevent damage to the parts removed.

(5) Remove bleed air duct probe from new slat.

(6) If slat No. 2 is being replaced, remove seal installed on inboard end of slat.

(7) If slat No. 1 is being replaced, remove temperature sensor access from slat. Manually retract sensor probe into leading edge.

(8) Adjust slat track rollers for required clearance (refer to 27-9-0, paragraph 2.B.).

(9) Adjust forward end of slat tracks in slat; refer to 27-9-0, steps 2.A.(4)(b), 2.A.(4)(c), 2.A.(4)(d), 2.A.(4)(f), and 2.A.(5)(b) through 2.A.(5)(f). This is a preliminary slat track adjustment and must be performed again when slat is properly fitted to leading edge. Disconnect aft end of track from trailing edge of slat.

(10) Install slat on leading edge by inserting aft ends of tracks between rollers and pushing slat against leading edge. Check gap between top and bottom surfaces of the slat and leading edge. This gap shall not exceed 0.030 inch on top of the leading edge and 0.040 inch at the bottom.

(11) If gap between top of leading edge and trailing edge of slat is excessive, and there is no clearance between the bottom edges, remove slat and file excess material from bottom edge (refer to 27-9-0, Figure 201).

CAUTION: MAKE SURE THAT FILING IS DONE EVENLY. UNEVEN FILING COULD RESULT IN EXCESSIVE CLEARANCE BETWEEN BOTTOMS OF LEADING EDGE AND SLAT.

(12) If a gap of constant width is obtained along the bottom edge of the slat (refer to 29-9-0, Figure 201, Detail F) and the gap between top of slat and leading edge is excessive (refer to 27-9-0, Figure 201, Detail E), check dovetail for foreign material in dovetail groove and for proper fit between dovetail tongue and groove. If tongue is too thick to fit into groove, use a "Great American Cross Cut" file to remove excess material from top of tongue. (The "Great American Cross Cut" is a flat file, round on one side and tapered to a thin edge at the other side.) Do not use the thin side of the file against the slat trailing edge. Do not remove any material from bottom of tongue.

(13) When gaps at top and bottom are approximately within limits, use splined adapter and speed wrench to extend actuators while holding trunnion blocks clear of leading edge skin. Install slat as in step (10) and connect trunnion blocks to slat. Make sure that trunnions are the same distance from ends of jackscrews.

(14) Using splined adapter and speed wrench, retract slat. Adjust slat retraction with torque wrench; refer to 27-9-0, step 2.E.(4). Check gap at top and bottom of leading edges. Gap should be the same width for full length of slat. If top gap is narrower at one end, disconnect torque tube between slat actuators (refer to Removal/Installation Leading Edge Flap and Slat Drive Torque Tubes), back off actuator at narrow end to obtain gap of constant width, and reconnect torque tube. Readjust slat retraction.

(15) Recheck gap at top and bottom of leading edge. If gap between leading edge and slat is of constant width and is within required limits at top and bottom, check mismatch between bottom surfaces of slat and leading edge. These surfaces must be flush within 0.016 inch.

(16) If surface mismatch is in excess of 0.016 inch, readjust slat track; refer to 27-9-0, steps 2.A.(4)(b), 2.A.(4)(c), 2.A.(4)(d), and 2.A.(4)(f). Make sure that slat is properly supported before disconnecting forward end of slat track as eyebolt is disconnected at aft end of slat track.

(17) Remove slat, install bleed air duct in slat, install slat and connect actuators, and retorque slat.

(18) With slat properly fitted and torqued, raise leading edge, connect air duct, torque tubes, wiring, etc, and lower the two leading edge sections simultaneously (refer to Chapter 57, WINGS).

(19) Connect torque tubes, air ducts, and wiring and install short baffles and leading edge accesses at engine pylons.

(20) Pressurize airplane's No. 1 and No. 2 hydraulic systems (refer to Chapter 29, HYDRAULIC POWER).

(21) Adjust and connect trailing ends of slat tracks; refer to 27-9-0, steps 2.E.(5)(c) through 2.E.(5)(g).

(22) Extend slats and install seal at outboard end of slat No. 2.

(23) Adjust guide hook roller supports (refer to 27-9-0, paragraph 2.C.

D. Install Leading Edge Slat No. 1 or 2.

NOTE: If any adjustable part such as slat tracks, adjustable track rollers, guide hook roller supports, or slat has been replaced or if the position of actuator ball nuts has been changed, slat installation must be readjusted (refer to 27-9-0, Adjustment/Test Leading Edge Flap and Slat Control System Adjustment). Normally, if original slat is being reinstalled and no adjustable part has been changed or repositioned, no readjustment will be required.

(1) Make sure that slats are completely extended. If they are not, pressurize the airplane's No. 1 and No. 2 hydraulic systems (refer to Chapter 29, HYDRAULIC POWER), and move the flap control lever to the 10° detent while manually guiding slat trunnion blocks out through skin of leading edge. Relieve hydraulic pressure (refer to Chapter 12, SERVICING).

(2) Carefully guiding bleed air inlet into outlet in leading edge, install slat and slat track top rollers. Use care to avoid damage to seal on inboard end of slat No. 2.

(3) Push slat up along tracks until screw holes match in slat and trunnions. Install trunnion mounting screws. Make sure that ball nuts have not been rotated while slat was removed.

(4) If installing slat No. 1, connect temperature sensor circuit quick-disconnect, connect sensor conduit in lower edge of slat, and install temperature sensor access panel and close RH or LH wing skin TEMP OVERHEAT circuit breaker.

(5) Pressurize airplane's No. 1 and No. 2 hydraulic systems, make sure that slats and flaps are clear, and move flap control lever to 0° detent. Check slat fit and clearances; refer to 27-9-0, steps 2.A.(3) through 2.A.(5).

(6) If installing slat No. 1, check operation of temperature sensor system (refer to Chapter 30, ICE AND RAIN PROTECTION).

(7) Check operation of leading edge flap and slat control system (refer to 27-9-0, Adjustment/Test Leading Edge Flap and Slat Control System Functional Test).

NOTE: If leading edge slat No. 1 or No. 2 only has been replaced and no other rigging or adjustment has been changed, check leading edge flap and slat control system operation per 27-9-0, steps 3.D.(1) through 3.D.(3), 3.D.(5), and paragraphs 3.E. and 3.H.

(8) Return airplane to normal configuration.

LEADING EDGE SLATS NO. 3 AND 4 - MAINTENANCE PRACTICES

1. Removal/Installation Leading Edge Slats No. 3 and 4 (see Figure 201)

   A. Equipment Required.

      (1) Stand suitable for reaching wing leading edge.

      (2) Bench suitable for supporting wing leading edge section after removal from wing.

      (3) Splined male adapter for adapting torque wrench to slat drive torque tubes.

      (4) Torque wrench.

      (5) External source of electrical power.

      (6) External source of hydraulic power.

   B. Remove Leading Edge Slat No. 3 or 4.

      (1) Connect external source of electrical power (refer to Chapter 24, ELECTRICAL POWER).

      (2) Close FLAP ASYM CONT circuit breaker and open RH or LH WING SKIN TEMP OVERHEAT circuit breaker on main circuit breaker panel.

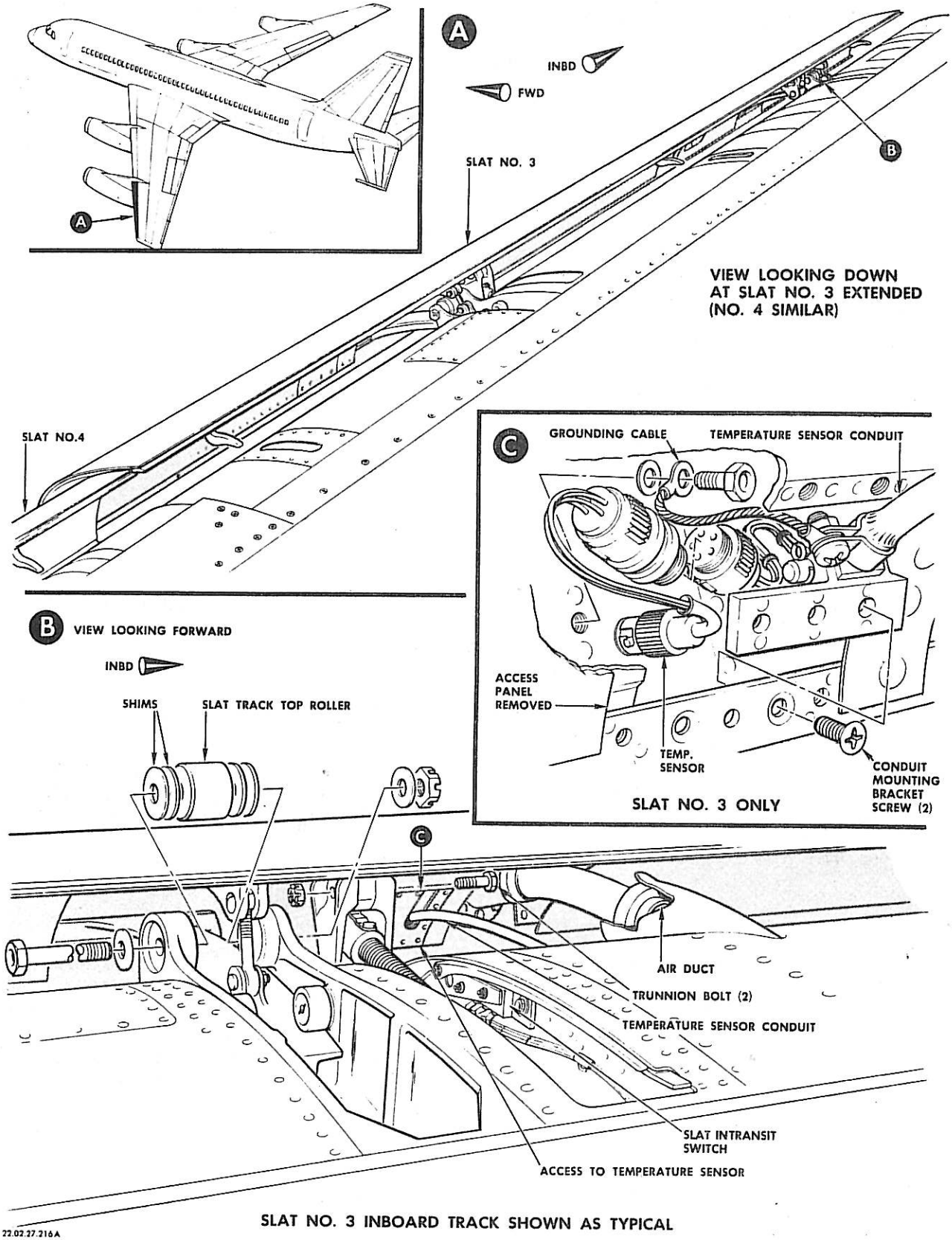
      (3) Connect external source of hydraulic power to airplane and pressurize No. 1 and 2 hydraulic systems (refer to Chapter 29, HYDRAULIC POWER).

         CAUTION: DO NOT OPERATE FLAPS WITH BOTH HYDRAULIC SYSTEMS PRESSURIZED UNLESS ELECTRICAL POWER IS APPLIED TO THE AIRPLANE AND THE "FLAP ASYM CONT" CIRCUIT BREAKER IS CLOSED.

      (4) Place FLAP POWER SELECT switch in NORMAL #1 position and actuate flap control lever to 10° detent to extend leading edge flaps and slats.

      (5) Depressurize hydraulic systems (refer to Chapter 12, SERVICING).

      (6) If removing slat No. 3, remove temperature sensor access panel from underside of slat. Disconnect temperature sensor sliding conduit by removing two screws from lower edge of slat to release conduit bracket (refer to 30-1-3, Leading Edge Temperature Sensors) and uncouple temperature sensor circuit quick-disconnect.



SLAT NO. 3 INBOARD TRACK SHOWN AS TYPICAL

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(7) Disconnect slats from slat actuators. Disconnect slat by removing four screws attaching each slat trunnion to slat. Allow slat to roll down against slat track top rollers. Do not remove slat trunnions from actuator ball nuts; this will prevent accidential rotation of actuator ball nuts.

(8) Support slat and remove slat track top rollers. Note positions of washers at each end of each top roller. Remove slat from leading edge.

CAUTION: MAKE SURE THAT SLAT IS SUFFICIENTLY SUPPORTED WHEN TOP ROLLERS ARE REMOVED. THERE ARE NO OTHER RETAINING ELEMENTS TO KEEP THE SLAT FROM FALLING OFF. USE CARE TO AVOID DAMAGE TO SEAL ON INBOARD END OF SLAT NO. 4.

C. Fit Leading Edge Slat No. 3 or 4 to Leading Edge.

NOTE: If the original slat is being reinstalled, fitting will normally not be required. New slats must always be fitted to the leading edge prior to installation.

(1) If slat No. 3 is to be fitted, pressurize airplane's No. 1 and No. 2 hydraulic systems (refer to Chapter 29, HYDRAULIC POWER).

(2) If fitting slat No. 3, move flap control lever to 0° detent and manually guide slat trunnion blocks back into leading edge. Blocks must be guided manually to prevent damage to leading edge skin. Slat No. 4 will also be retracted. Trunnion blocks and slat No. 4 should be retracted to prevent interference with slat No. 3 during fitting. Slat No. 4 will remain properly adjusted while torque tubes are disconnected. If slat No. 4 is being fitted, retract trunnion blocks in the same way, or manually after torque tubes are disconnected or leading edge has been removed.

NOTE: Slats may be fitted without removing leading edge from wing if, for slat No. 3, outboard engine pylon outboard and top fairings are removed, or, for slat No. 4, if a "snake" or 90° angle drive can be used with a drill motor at the inboard end of slat No. 4 leading edge to drive the torque tube adapter. However, due to the difficulty of driving the slat actuating torque tubes with the leading edge installed, and as the slat must be installed on, and removed from, the leading edge several times during fitting, it is recommended that the leading edge section be removed.

(3) Relieve hydraulic system pressure (refer to Chapter 12, SERVICING).

CAUTION: DO NOT USE HYDRAULIC POWER TO ACTUATE SLAT UNTIL SLAT IS PROPERLY FITTED AND ADJUSTED.

(4) Remove access door from bottom of each end of leading edge section to which new slat is to be fitted. Remove short section of baffle from inside each access door.

(5) Disconnect torque tubes (refer to Removal/Installation Slat Drive Torque Tubes), bleed air ducts, and wiring and remove leading edge section (refer to Chapter 57, WINGS).

(6) Place wing leading edge on bench with base down.

NOTE: The leading edge must be installed on the wing for final check of slat fit. Steps (6), (7), and (8) are intended only to prevent damage to parts and inconvenience during fitting.

(7) Remove bleed air duct probe from new slat.

(8) If fitting slat No. 3, remove temperature sensor access from slat. Manually retract sensor probe into leading edge. Tie probe in retracted position if necessary to avoid damage during fitting.

(9) Adjust slat track rollers for required clearance (refer to 27-9-0, paragraph 2.B.).

(10) Adjust forward end of slat tracks in slat; refer to 27-9-0, steps 2.A.(4)(b), 2.A.(4)(c), 2.A.(4)(d), 2.A.(4)(f), and 2.A.(5)(b) through 2.A.(5)(f). This is a preliminary slat track adjustment and must be repeated when slat is properly fitted to the leading edge. Disconnect aft end of track from trailing edge of slat.

(11) Install slat on leading edge by inserting aft end of tracks between rollers and pushing slat against leading edge. Check gap between top and bottom surfaces of slat and leading edge. Gap shall not exceed 0.030 inch at top of leading edge and 0.040 inch at bottom.

(12) If gap between top surface of leading edge and top of slat trailing edge is excessive, and there is no clearance between bottom edges, remove slat and file excess material from bottom edge (refer to 27-9-0, Figure 201).

CAUTION: MAKE SURE THAT SLAT BOTTOM EDGE IS FILED EVENLY TO OBTAIN A CONSTANT CLEARANCE BETWEEN BOTTOM EDGES OF SLAT AND LEADING EDGE.

(13) If a gap of constant width is obtained along the bottom edge of the slat (refer to 27-9-0, Figure 201, Detail F) and the gap between top of slat and leading edge (refer to 27-9-0, Figure 201, Detail E) is excessive, check dovetail for foreign material in dovetail groove and for proper fit between dovetail tongue and dovetail groove. If dovetail tongue is too thick to fit into dovetail groove, use a "Great American Crosscut" file and remove excess material from top of tongue. (The "Great American Crosscut" is a flat file, round on one side; tapered to a thin edge at the other side.) Do not use the thin side of the file against the slat trailing edge. Do not file any material from bottom of tongue.

(14) When gap at top and bottom is approximately equal, hold trunnion blocks clear of leading edge skin and use splined adapter and speed wrench to extend slat actuators. Install slat as in step (11) and connect trunnion blocks to slat. Make sure that trunnions are the same distance from ends of jack screws so slat will be parallel to leading edge.

(15) Retract slat, using splined adapter and speed wrench. Using splined adapter and torque wrench, adjust slat retraction; refer to 27-9-0, step 2.E.(4).

(16) Check gap at top and bottom of leading edge. If gap between leading edge and slat is within required limits at top and bottom, check mismatch between bottom surfaces of slat and leading edge. Surfaces must be flush within 0.016 inch.

(17) If surface mismatch is excessive, readjust slat track; refer to 27-9-0, steps 2.A.(4)(b), 2.A.(4)(c), 2.A.(4)(d), and 2.A.(4)(f). Make sure that slat is properly supported before disconnecting forward end of slat track as eyebolt is disconnected at aft end of track.

(18) Install slat and leading edge on wing. Install only as many leading edge retaining screws as are necessary to hold leading edge while checking surface gap and mismatch. Readjust as necessary.

(19) With slat properly fitted, complete installation of leading edge section (refer to Chapter 57, WINGS). Connect air ducts, torque tubes, and wiring and install short baffles inside access doors. Install access doors.

(20) Remove slat, install bleed air duct probe in slat, install slat and connect actuators, and retorque slat.

(21) Pressurize airplane's No. 1 and No. 2 hydraulic systems (refer to Chapter 29, HYDRAULIC POWER).

(22) Adjust and connect trailing ends of slat tracks; refer to 27-9-0, steps 2.E.(5)(c) through 2.E.(5)(g).

(23) Adjust guide hook roller supports (refer to 27-9-0, paragraph 2.C.

(24) Complete installation of slat.

D. Install Leading Edge Slat No. 3 or 4.

NOTE: If any adjustable part such as slat tracks, adjustable track rollers, guide hook roller supports, or slat has been replaced, or if the position of actuator ball nuts has been changed, slat installation must be readjusted (refer to Adjustment/Test Leading Edge Flap and Slat Control System Adjustment). Normally, if the original slat is being reinstalled and no adjustable part has been changed or repositioned, no readjustment will be required.

(1) Make sure that slats are completely extended. If they are not, pressurize the airplane's No. 1 and No. 2 hydraulic systems (refer to Chapter 29, HYDRAULIC POWER) and move the flap control lever to the 10° detent while manually guiding slat trunnion blocks of removed slat out through skin of leading edge. Relieve hydraulic pressure (refer to Chapter 12, SERVICING).

(2) Carefully guiding bleed air inlet into outlet in leading edge, install slat and slat track top rollers. Use care to avoid damage to seal on inboard end of slat No. 4.

(3) Push slat up along tracks until screw holes in slat match holes in slat trunnions. Install screws to connect slat and trunnions. Make sure that slat is installed parallel to leading edge.

(4) If installing slat No. 3, connect temperature sensor circuit quick-disconnect (refer to 30-1-3, Leading Edge Slat Temperature Sensors), install sensor conduit bracket in lower edge of slat; install sensor access panel and close RH or LH wing skin TEMP OVERHEAT circuit breaker.

(5) Make sure that slats and flaps are clear to move and move flap control lever to 0° detent to retract slats. Check slat fit and surface mismatch (refer to; 27-9-0, steps 2.A.(3) through 2.A.(5).

(6) If installing slat No. 3 check operation of temperature sensor system (refer to Chapter 30, ICE AND RAIN PROTECTION).

(7) Check operation of Leading edge flap and slat control system (refer to 27-9-0, Adjustment/Test Leading Edge Flap and Slat Control System Functional Test).

NOTE: If leading edge slat No. 3 or No. 4 only has been replaced and no other rigging or adjustment has been changed, check leading edge flap and slat control system operation per 27-9-0, steps 3.D.(1) through 3.D.(3), 3.D.(5), and paragraphs 3.E. and 3.H.

(8) Return airplane to normal configuration.

LEADING EDGE FLAP AND SLAT DRIVE TORQUE TUBES - MAINTENANCE PRACTICES

1. Removal/Installation Leading Edge Flap and Slat Drive Torque Tubes (see Figure 201)

A. Equipment Required.

(1) Stand suitable for reaching wing leading edges.

(2) Splined male adapter to adapt wrench to end of torque tube.

(3) External source of hydraulic power.

(4) External source of electrical power.

B. Torque Tube Quick-Disconnects.

The torque tube assemblies are connected by means of spring-loaded male and female splined couplings and by flexible sprocket and chain couplings. The chain couplings are double safetied by using rubber boots over the chains to hold the closing links in position if the snap lock plates should disengage. The spring-loaded splined couplings automatically extend or contract as required by wing deflection. Torque tubes may be disconnected by removing the rubber boot and chain from the chain coupling accessible through leading edge access doors, or by retracting a female splined section until the splined coupling disengages.

NOTE: If the leading edge flap and slat system is not fully retracted before torque tubes are disconnected and if the system is actuated while torque tubes are disconnected, the disconnected slats or flap actuators must be individually torqued before they are again connected to the main drive gearbox (refer to 27-9-0, paragraph 2.E.).

C. Remove Slat Drive Inboard Torque Tube.

(1) Remove fairing from top or bottom of inboard leading edge stub. Remove access panel from bottom of outboard end of leading edge stub.

(2) Disconnect leading edge flap drive torque tube at outboard end of leading edge stub. Pull universal joint inboard to compress spring-loaded splined coupling. When splines disengage, remove universal joint and spring. Pull torque tube segment outboard and remove. Remove universal joint from outboard side of reduction gearbox.

(3) Remove access door from inside outboard end of leading edge stub, disconnect bleed air ducts, wiring, and tubing, and raise inboard leading edge sections (refer to Chapter 57, WINGS).

(4) Remove two bolts attaching each of two bearing block supports to front of front wing spar. Do not dismount inboard bearing block support.

(5) At inboard side of inboard engine pylon, pull inboard on quick-disconnect to compress torque tube spring until splined coupling disengages at inboard side of off-set gearbox. Remove short section of torque tube and spring if possible, or, remove simultaneously with long section to be removed in step (6).

(6) Rotate bearing blocks to clear mounting brackets and pull torque tube outboard to disengage torque tube from splined shaft in inboard bearing block. Remove torque tube.

(7) Push inboard on universal joint at inboard side of inboard bearing block, disengage splines of universal joint and bearing block shaft, and remove universal joint. Pull torque tube to disengage inboard universal joint from reduction gearbox. Retain spring. Dismount inboard torque tube bearing block if necessary.

D. Install Slat Drive Inboard Torque Tube.

(1) Install short torque tube segment in leading edge stub. Engage splines of universal joint with reduction gearbox output shaft.

(2) Install spring and universal joint between outboard end of short torque tube and inboard side of inboard bearing block. If inboard bearing block was dismounted, install bearing block and mounting bolts.

(3) Engage splines of inboard end of long torque tube segment with splined shaft of inboard bearing block.

(4) Install spring and short torque tube segment (quick-disconnect segment) on outboard end of long torque tube, push short segment inboard to compress spring, and engage with splined shaft on inboard side of off-set gearbox.

(5) Position bearing blocks in mounting brackets and install mounting bolts.

(6) Lower leading edge sections; connect bleed air ducts, wiring, and tubing (refer to Chapter 57, WINGS).

(7) Engage splines of leading edge flap drive torque tube with output shaft of reduction gearbox. Install spring and universal joint on outboard end of torque tube. Compress spring and engage outboard universal splines with torque tube splines at inboard end of leading edge flap No. 1.

NOTE: If leading edge flaps and slats were in any position other than fully retracted, and system was operated while torque tubes were disconnected, leading edge flap and slat retraction must be readjusted (refer to 27-9-0, paragraph 2.E.).

(8) Check wing leading edge flap and slat control system operation (refer to 27-9-0, Adjustment/Test Leading Edge Flap and Slat Control System Functional Test).

NOTE: If a slat drive torque tube only has been replaced and no other rigging or adjustment has been changed, check leading edge flap and slat control system operation per 27-9-0, paragraphs 3.D. and 3.E.

(9) Check bleed air ducts for leaks (refer to Chapter 36, PNEUMATICS).

(10) Install access panels, inside outboard end of leading edge stub and at each end of stub.

E. Remove Slat No. 1 Torque Tube.

NOTE: Slat No. 1 torque tube is contained in the section of leading edge under slat No. 1. It is necessary to raise the leading edge section in order to remove the torque tube. Due to the difficulty of disconnecting the torque tube at the break between slats No. 1 and 2, it is recommended that leading edge sections beneath slats No. 1 and 2 be raised simultaneously.

(1) Remove accesses from inboard end of slat No. 1 and outboard end of slat No. 2 leading edge sections.

(2) Remove short section of baffle from inside each access, disconnect torque tubes and bleed air ducts, and raise leading edge sections (refer to Chapter 57, WINGS).

(3) Remove fiberglass baffles from rear of leading edge.

(4) Uncouple quick-disconnect at outboard end of inboard torque tube segment. Remove universal joint.

(5) Remove spanner nut from inboard end of inboard torque tube segment. Pull segment outboard and remove from leading edge.

(6) Remove two retaining bolts from torque tube bearing block three inches inboard of inboard actuator. Pull bearing block inboard to disengage splines from actuator gearbox and remove from leading edge.

(7) Uncouple quick-disconnect at inboard side of outboard actuator. Shift torque tube segment outboard to disengage splines from inboard actuator.

(8) Remove two bolts from each inboard actuator trunnion block and swing actuator gearbox toward bottom of leading edge.

(9) Remove center torque tube segment through inboard end of leading edge.

(10) Uncouple quick-disconnect at break between slats No. 1 and 2. Shift torque tube outboard and remove universal joint.

(11) Remove two retaining bolts from torque tube bearing block 3-1/2 inches outboard of outboard actuator, pull bearing block outboard to disengage splines from actuator and remove bearing block with torque tube segment.

(12) If torque tube segment adjacent to break between slats No. 1 and 2 is to be removed, remove short baffle between leading edge sections, disconnect bleed air duct, and lower slat No. 2 and leading edge section (refer to Chapter 57, WINGS). Remove torque tube segment from outboard end of raised leading edge section.

F. Install Slat No. 1 Torque Tube.

(1) Install outboard torque tube segment through outboard end of leading edge section. Raise slat No. 2 and leading edge section, connect bleed air duct, and install short baffle (refer to Chapter 57, WINGS).

(2) Install four-inch torque tube and bearing block on outboard side of outboard actuator. Engage torque tube splines in actuator gearbox and install two retaining bolts.

(3) Install universal joint at bearing block and couple quick-disconnect at break between slats No. 1 and 2.

(4) Install center torque tube segment through inboard end of leading edge section. Do not couple at outboard actuator.

(5) Position actuator gearbox and trunnion blocks to proper position and install two retaining bolts in each block.

(6) Engage center torque tube segment splines in actuator gearbox and couple quick-disconnect at outboard actuator.

(7) Install four-inch torque tube segment and bearing block on inboard side of inboard actuator. Engage torque tube splines in actuator and install two bearing block retaining bolts.

(8) Install inboard torque tube segment from outboard side of inboard bearing block. Install spanner nut.

(9) Install universal joint inboard of inboard actuator and couple quick-disconnect.

(10) Install fiberglas baffles in rear of leading edge section.

(11) Lower leading edge sections (refer to Chapter 57, WINGS).

(12) Install short sections of baffle inside leading edge accesses and connect torque tube quick-disconnects.

(13) Check wing leading edge flap and slat control system operation (refer to 27-9-0, Adjustment/Test Leading Edge Flap and Slat Control System Functional Test).

NOTE: If a slat No. 1 torque tube only has been replaced and no other rigging or adjustment has been changed, check leading edge flap and slat control system operation per 27-9-0, paragraphs 3.D. and 3.E.

(14) Install access doors and fairing.

G. Remove Slat No. 2 Torque Tubes.

NOTE: Slat No. 2 torque tube installation is similar to the slat No. 1 installation. There is no spanner nut at the inboard end of slat No. 2 torque tubes. Two "Truarc" retaining rings are used to retain the outboard end of the torque tubes. Removal of slat No. 2 torque tubes is similar to the removal of slat No. 1 torque tubes except that the retaining rings are removed and torque tubes are removed from the outboard end of the leading edge section.

H. Install Slat No. 2 Torque Tubes.

NOTE: Installation of slat No. 2 torque tubes is similar to the installation of slat No. 1 torque tubes except that torque tubes are installed through the outboard end of the leading edge section (except the inboard segment adjacent to the break between slats No. 1 and 2) and the outboard end of the outboard torque tube segment is retained by two retaining rings.

I. Remove Engine Pylon Crossover Torque Tubes.

(1) Remove accesses from leading edge at inboard end of slat No. 1 and at outboard end of slat No. 2.

(2) Remove short baffles from inside access doors, disconnect bleed air ducts and torque tube quick-disconnects, and raise leading edge sections under slats No. 1 and 2 simultaneously (refer to Chapter 57, WINGS).

(3) Remove crossover torque tube from inboard engine pylon by pulling torque tube outboard. Remove universal joint separately if necessary.

(4) Remove outboard engine pylon crossover torque tube through leading edge stub inboard of pylon. Remove universal joint separately if necessary.

J. Install Engine Pylon Crossover Torque Tubes.

(1) Install outboard engine pylon crossover torque tube through leading edge stub inboard of pylon. Engage universal joint splines with slat No. 3 torque tube.

(2) Install inboard engine pylon crossover torque tube. Engage universal joint splines with off-set gearbox.

(3) Lower leading edge sections under slats No. 1 and 2 simultaneously (refer to Chapter 57, WINGS). Connect torque tubes and bleed air ducts and install baffles inside access doors.

(4) Check wing leading edge flap and slat control system operation (refer to 27-9-0, Adjustment/Test Leading Edge Flap and Slat Control System Functional Test).

NOTE: If an engine pylon crossover torque tube only has been replaced and no other rigging or adjustment has been changed, check leading edge flap and slat control system operation per paragraphs 3.D. and 3.E.

(5) Check bleed air ducts for leaks (refer to Chapter 36, PNEUMATICS).

(6) Install access doors and fairings.

K. Remove Slat No. 3 Torque Tubes.

NOTE: Slat No. 3 torque tube installation is identical to slat No. 1 torque tube installation except that the leading edge section under slat No. 3 is completely removed from the wing in order to remove torque tubes. As no retainers are used on the torque tubes at the outboard end of the leading edge section it is recommended that torque tubes be removed through the outboard end. If torque tube segments inboard of inboard actuator are to be removed, they should be removed through inboard end.

L. Install Slat No. 3 Torque Tubes.

NOTE: Installation of slat No. 3 torque tubes is identical to installation of slat No. 1 torque tubes.

M. Remove Slat No. 4 Torque Tubes.

(1) Remove access door from leading edge below each end of slat No. 4.

(2) Uncouple torque tube quick-disconnect at inboard end of slat No. 4, disconnect bleed air duct at each end of leading edge section, and remove leading edge section (refer to Chapter 57, WINGS).

(3) Remove fiberglas baffles as necessary to obtain access to torque tube segments.

(4) Disengage universal joint splines at bearing block inboard of inboard actuator. Remove inboard torque tube segment.

(5) Remove two retaining bolts from bearing block approximately two inches inboard of inboard actuator, disengage torque tube segment splines from actuator gearbox, and remove torque tube segment with bearing block.

(6) Uncouple quick-disconnect at outboard actuator, disengage splines at inboard actuator, and remove center torque tube segment.

NOTE: It is not necessary to remove torque tube segments through end of slat No. 4 leading edge section as torque tube segments are mounted behind leading edge ribs.

N. Install Slat No. 4 Torque Tubes.

(1) Engage center torque tube segment splines with inboard actuator, install torque tube universal joint in outboard actuator, and engage quick-disconnect coupling.

(2) Engage three-inch torque tube segment splines with inboard side of inboard actuator and install two bearing block retaining bolts.

(3) Engage universal joint splines with torque tube in bearing block and with inboard torque tube segment.

(4) Install any fiberglas baffles removed for access to torque tubes.

(5) Install leading edge section (refer to Chapter 57, WINGS), connect bleed air ducts, install short baffles inside access openings, and connect torque tube at inboard end.

(6) Check wing leading edge flap and slat control system operation (refer to 27-9-0, Adjustment/Test Leading Edge Flap and Slat Control System Functional Test).

NOTE: If a slat No. 4 torque tube only has been replaced and no other rigging or adjustment has been changed, check leading edge flap and slat operation per 27-9-0, paragraphs 3.D. and 3.E.

(7) Install access doors.

O. Remove Fuselage Torque Tubes.

(1) Open or remove fabric curtain at aft end of forward cargo compartment.

(2) Remove two bolts retaining torque tube bearing block approximately 11 inches from center of fuselage.

(3) Uncouple quick-disconnect at angle gearbox in left side of fuselage.

(4) Disengage torque tube splines from main drive gearbox and remove torque tube.

(5) Remove forward side and bottom of main drive gearbox shroud.

(6) Uncouple quick-disconnect between main drive gearbox and angle gearbox in right side of fuselage. Remove universal joints from main drive gearbox and angle drive gearbox.

P. Install Fuselage Torque Tubes.

(1) Engage short splines of universal joints with main drive gearbox and with angle drive gearbox. Couple quick-disconnect.

(2) Engage long torque tube splines with splines of main drive gearbox inboard output shaft. Spacer (sleeve) must be installed between gearbox and torque tube on left side of gearbox.

(3) Couple quick-disconnect at angle drive gearbox at left side of fuselage.

(4) Make sure that splines are properly engaged at main drive gearbox and at angle drive gearbox and install two retaining bolts in bearing block approximately 11 inches left of airplane center.

(5) Install forward side and bottom of main drive gearbox shroud.

(6) Check wing leading edge flap and slat control system operation (refer to 27-9-0, Adjustment/Test Leading Edge Flap and Slat Control System Functional Test).

NOTE: If a fuselage torque tube only has been replaced and no other rigging or adjustment has been changed, check leading edge flap and slat operation per 27-9-0, paragraphs 3.D. and 3.E.

Q. Remove Leading Edge Flap No. 1 Torque Tubes.

(1) Connect external source of electrical power (refer to Chapter 24, ELECTRICAL POWER).

(2) Close FLAP ASYM CONT circuit breaker on main circuit breaker panel.

(3) Connect external source of hydraulic power to airplane and pressurize No. 1 and 2 hydraulic systems.

CAUTION: DO NOT OPERATE FLAPS WITH BOTH HYDRAULIC SYSTEMS PRESSURIZED UNLESS ELECTRICAL POWER IS APPLIED TO THE AIRPLANE AND THE "FLAP ASYM CONT" CIRCUIT BREAKER IS CLOSED.

(4) Place FLAP POWER SELECT switch in NORMAL #1 position and move flap control lever to 0° detent to retract leading edge flaps. Remove access panels from flap No. 1 and inboard end of flap No. 2. Relieve hydraulic pressure (refer to Chapter 12, SERVICING).

(5) Uncouple torque tube quick-disconnect at inboard and outboard ends of leading edge section above flap No. 1.

NOTE: If leading edge flap and slat system is jammed, retraction of leading edge flaps disconnected from main drive gearbox must be readjusted before they are again connected into the system (refer to 27-9-0, paragraph 2.F.).

(6) Disconnect bleed air ducts at each end of leading edge section and raise leading edge (refer to Chapter 57, WINGS). Support leading edge in raised position.

(7) Remove short torque tube segment from each end of leading edge. Pull torque tube segments straight out through ends of leading edge.

(8) Remove torque tube from between actuators as follows:

(a) Uncouple quick-disconnect in defective torque tube and remove torque tube stub.

(b) Remove eight actuator gearbox mounting bolts and shift gearbox from between defective torque tube and end of leading edge (refer to Removal/Installation Leading Edge Flap Actuators).

(c) Thread torque tube out through end of leading edge.

R. Install Leading Edge Flap No. 1 Torque Tubes.

(1) Install torque tube between actuators as follows:

(a) Install torque tube through end of leading edge.

(b) Position actuator gearbox and install eight gearbox mounting bolts (refer to Removal/Installation Leading Edge Flap Actuators).

(c) Insert splined ends of torque tube into actuator gearboxes and connect quick-disconnect coupling. Quick-disconnect should be at outboard end of torque tube.

(2) Install short segments of torque tube in ends of leading edge. Insert splined ends into actuator gearboxes.

(3) Lower leading edge section and connect bleed air duct (refer to Chapter 57, WINGS).

(4) If torque tubes were disconnected with leading edge flaps in any position other than fully retracted, check leading edge flap retraction (refer to 27-9-0, paragraph 2.F.). Check all disconnected flaps.

(5) Make sure remainder of leading edge flap and slat system is fully retracted and couple torque tube quick-disconnects.

(6) Pressurize airplane's No. 1 and No. 2 hydraulic systems. Check operation of leading edge flap and slat system (refer to 27-9-0, Adjustment/Test Leading Edge Flap and Slat Control System Functional Test).

NOTE: If a leading edge flap No. 1 torque tube only has been replaced and no other rigging or adjustment has been changed, check leading edge flap and slat control system operation per 27-9-0, paragraphs 3.D. and 3.E.

(7) Check bleed air duct for leaks (refer to Chapter 36, PNEUMATICS).

(8) Relieve hydraulic system pressure (refer to Chapter 12, SERVICING) and install all access panels.

S. Remove Leading Edge Flap No. 2 Torque Tubes.

(1) Pressurize airplane's No. 1 and No. 2 hydraulic systems (refer to Chapter 29, HYDRAULIC POWER).

(2) Move flap control lever to 0° detent to retract leading edge flaps.

(3) Remove access panels from outboard end of flap No. 1, from flap No. 2, from leading edge above outboard end of flap No. 2, and from leading edge above flap No. 3.

(4) Uncouple torque tube quick-disconnects at inboard and outboard ends of leading edge section above flap No. 2.

NOTE: If leading edge flap and slat system is jammed, or if torque tubes are disconnected with leading edge flaps in any position other than fully retracted, retraction of leading edge flaps disconnected from main drive gearbox must be adjusted before flaps are again connected into system (refer to Adjustment/Test Leading Edge Flap and Slat Control System Adjustment).

(5) Disconnect bleed air ducts at each end of leading edge section and raise leading edge section (refer to Chapter 57, WINGS). Support leading edge in raised position.

(6) Remove torque tube segments from ends of leading edge section.

(7) Dismount either actuator gearbox by removing eight gearbox mounting bolts. Shift gearbox to clear torque tube openings in leading edge ribs (refer to Removal/Installation Leading Edge Flap Actuator).

(8) Remove center segment of torque tube through end of leading edge. Remove torque tube stub.

T. Install Leading Edge Flap No. 2 Torque Tubes.

(1) Insert long, center segment of torque tube through end of leading edge section.

(2) Position actuator gearbox and install eight gearbox mounting bolts (refer to Removal/Installation Leading Edge Flap Actuator).

(3) If torque tubes were disconnected with leading edge flaps in any position other than fully retracted, check leading edge flap retraction (refer to 27-9-0, paragraph 2.F.).

(4) Insert splined ends of torque tube into actuator gearboxes and connect quick-disconnect coupling between actuators. Torque tube stub should be at outboard actuator.

(5) Install short segments of torque tube throught ends of leading edge section and engage splined ends of torque tubes with splined actuator gearbox splines.

(6) Lower leading edge section and connect bleed air ducts at each end (refer to Chapter 57, WINGS).

(7) Make sure that remainder of leading edge flap and slat system is fully retracted and connect quick-disconnect coupling at each end of leading edge section.

(8) Check operation of leading edge flap and slat system (refer to 27-9-0, Adjustment/Test Leading Edge Flap and Slat Control System Functional Test).

NOTE: If a leading edge flap No. 2 torque tube only has been replaced and no other rigging or adjustment has been changed, check leading edge flap and slat control system operation per 27-9-0, paragraphs 3.D. and 3.E.

(9) Check bleed air duct for leaks (refer to Chapter 36, PNEUMATICS).

(10) Relieve hydraulic pressure (refer to Chapter 12, SERVICING) and install access panels.

U. Remove Leading Edge Flap No. 3 Torque Tube.

(1) Pressurize airplane's No. 1 and No. 2 hydraulic systems (refer to Chapter 29, HYDRAULIC POWER).

(2) Move flap control lever to 0° detent to retract leading edge flaps.

(3) Remove access panels from above leading edge flap No. 3 and outboard end of flap No. 2.

(4) Uncouple torque tube quick-disconnect at inboard end of leading edge flap No. 3.

NOTE: If leading edge flap and slat system is jammed, or if torque tube is disconnected with leading edge flaps in any position other than fully retracted, retraction of leading edge flap disconnected from main drive gearbox must be adjusted before flaps are again connected into system (refer to 27-9-0, paragraph 2.F.).

(5) Disconnect bleed air ducts at each end of leading edge section and raise leading edge section (refer to Chapter 57, WINGS). Support leading edge in raised position.

(6) Remove torque tube segment from inboard end of leading edge.

U. Install Leading Edge Flap No. 3 Torque Tube.

(1) If leading edge flap No. 3 is not fully retracted, retract flap and adjust flap retraction (refer to 27-9-0, paragraph 2.F.).

(2) Install torque tube segment in inboard end of leading edge section.

(3) Lower leading edge section and connect bleed air ducts at each end of section (refer to Chapter 57, WINGS).

(4) Make sure that remainder of leading edge flap and slat system is fully retracted and connect torque tube.

(5) Check operation of leading edge flaps and slats (refer to Adjustment/Test Leading Edge Flap and Slat Control System Functional Test).

NOTE: If a leading edge flap No. 3 torque tube only has been replaced and no other rigging or adjustment has been changed, check leading edge flap and slat control system operation per 27-9-0, paragraph 3.D. and 3.E.

(6) Check bleed air duct for leaks (refer to Chapter 36, PNEUMATICS).

(7) Disconnect hydraulic power unit, install access panels, and return airplane to normal configuration.

LEADING EDGE FLAP AND SLAT MAIN DRIVE GEARBOX - MAINTENANCE PRACTICES

1. Removal/Installation Leading Edge Flap and Slat Main Drive Gearbox (see Figure 201)

A. Equipment Required.

(1) Splined male adapter to adapt torque wrench to slat drive torque tubes.

(2) Torque wrench.

(3) Drip pan.

(4) External source of electrical power.

(5) External source of hydraulic power.

B. Remove Slat Main Drive Gearbox.

(1) Connect external source of electrical power (refer to Chapter 24, ELECTRICAL POWER).

(2) Close FLAP ASYM CONT circuit breaker on main circuit breaker panel.

(3) Connect external source of hydraulic power to airplane and pressurize No. 1 and 2 hydraulic systems.

CAUTION: DO NOT OPERATE FLAPS WITH BOTH HYDRAULIC SYSTEMS PRESSURIZED UNLESS ELECTRICAL POWER IS APPLIED TO THE AIRPLANE AND THE "FLAP ASYM CONT" CIRCUIT BREAKER IS CLOSED.

(4) Place FLAP POWER SELECT switch in NORMAL #1 position and move flap control lever to 0^{o} detent to retract leading edge flaps and slats, if possible. Relieve hydraulic pressure (refer to Chapter 12, SERVICING).

NOTE: If leading edge flaps and slats are not retracted, or if gearbox is inoperable, it will be necessary to manually retract flaps and slats and readjust individual flap and slat retraction in order to set gearbox stops at installation (refer to 27-9-0, paragraphs 2.E. and 2.F.

(5) Remove fabric curtain from rear of forward cargo compartment (refer to Chapter 25, EQUIPMENT/FURNISHINGS).

(6) Remove fresh-water tank (refer to Chapter 38, WATER/WASTE).

(7) Remove shroud from around slat main drive gearbox.

(8) Disconnect torque tube at left-hand side of airplane by forcing coupling back on splines against spring. Remove two bolts from torque tube support at midpoint of torque tube and pull torque tube off of main drive gearbox output shaft.

(9) Remove short section of torque tube between main drive gearbox and right-hand side of airplane.

(10) Disconnect control cable.

(11) Disconnect and remove both hydraulic pressure supply lines. Use drip pan to catch hydraulic oil. (Cap or plug each end of both lines and all open ports to prevent entry of foreign materials; identify lines for use at installation.)

(12) Disconnect flexible hydraulic return lines. (Cap or plug open lines and ports to prevent entry of foreign materials.)

(13) Remove bolt attaching hydraulic line support clip to deck structure above main drive gearbox.

(14) Remove three main drive gearbox mounting bolts and remove gearbox.

C. Install Slat Main Drive Gearbox.

(1) Position slat main drive gearbox.

(2) Attach hydraulic line support clip to deck structure above slat main drive gearbox.

(3) Connect flexible hydraulic system return lines and install hydraulic system pressure lines.

(4) Connect control cables. Rig cables so that when flap control lever is in 0^{o} detent, pilot input cam on slat control valve is rotated as far as possible in counterclockwise direction, as seen when looking outboard at gearbox.

(5) Bleed flap and slat hydraulic system and perform leak test (refer to Adjustment/Test Flap Control System Bleeding Procedure).

(6) Pressurize airplane's No. 1 and No. 2 hydraulic systems to 1000 psig. Slat main drive gearbox should operate in the retract direction. Check rotation of output shaft on inboard side of gearbox. Rotation should be counterclockwise. As gearbox operates, followup stops will rotate clockwise until adjustable stop hits roller and moves control valve linkage forward to place control valve in neutral.

(7) With slats and flaps fully retracted and adjusted as outlined in 27-9-0, paragraphs 2.F. and 2.E., connect torque tubes to gearbox output shaft. If slats were fully retracted before removal of gearbox, readjustment should not be required.

(8) With hydraulic power unit operating, reduce output pressure and flow to zero. Move flap control lever to 10° detent. Increase output of hydraulic power unit until leading edge flaps and slats start to extend. Extend leading edge flaps and slats as slowly as possible until ball nuts on slat No. 1 actuators are 1/8 to 3/8 of one revolution of jack screws from ends of jack screws. Reduce hydraulic power to zero pressure and flow.

CAUTION: DO NOT ALLOW BALL NUTS TO CONTACT ENDS OF JACK SCREWS WITH HYDRAULIC POWER APPLIED. JACK SCREW ENDS ARE NOT STOPS AND MAY BE SEPARATED FROM JACK SCREWS IF BALL NUTS ARE ALLOWED TO PUSH AGAINST THEM.

(9) Adjust extend followup stop on main drive gearbox to move followup crank aft of its center position. When stop is properly adjusted, bottom of valve actuating arm will move 1/4 inch to move control valve to null position. (Refer to 27-9-0, Description and Operation.)

(10) With hydraulic power unit set to provide minimum operating pressure and flow, check extension and retraction of slats (refer to 27-9-0, paragraph 3.D.).

(11) Check operation of slat system with normal operating hydraulic pressure and flow (refer to 27-9-0, Adjustment/Test Leading Edge Flap and Slat Control System Functional Test).

NOTE: If the slat main drive gearbox only has been replaced and no other rigging or adjustment has been changed, check leading edge flap and slat control system operation per 27-9-0, paragraphs 3.D., 3.E. and 3.F.

(12) Install shroud around main drive gearbox.

(13) Install fresh-water tank (refer to Chapter 38, WATER/WASTE).

(14) Install fabric curtain in rear of cargo compartment (refer to Chapter 25, EQUIPMENT/FURNISHINGS).

(15) Return airplane to normal configuration.

LEADING EDGE FLAP AND SLAT DRIVE MOTORS - MAINTENANCE PRACTICES

1. Removal/Installation Leading Edge Flap and Slat Drive Motors (see Figure 201)

A. Equipment Required.

(1) Container for draining disconnected hydraulic lines.

B. Remove Drive Motor.

(1) Remove fabric curtain from rear of forward cargo compartment (refer to Chapter 25, EQUIPMENT/FURNISHINGS).

(2) Remove shroud from main drive gearbox.

(3) Check that hydraulic systems are depressurized.

(4) Disconnect hydraulic pressure and return lines from motor.

(5) Drain disconnected hydraulic lines and motor.

(6) Remove four bolts attaching motor to mounting pad on main drive gearbox.

(7) Remove motor from mounting pad.

(8) Clean up spilled hydraulic fluid.

C. Install Drive Motor.

(1) Position motor on mounting pad and install four mounting bolts.

(2) Connect hydraulic pressure and return lines.

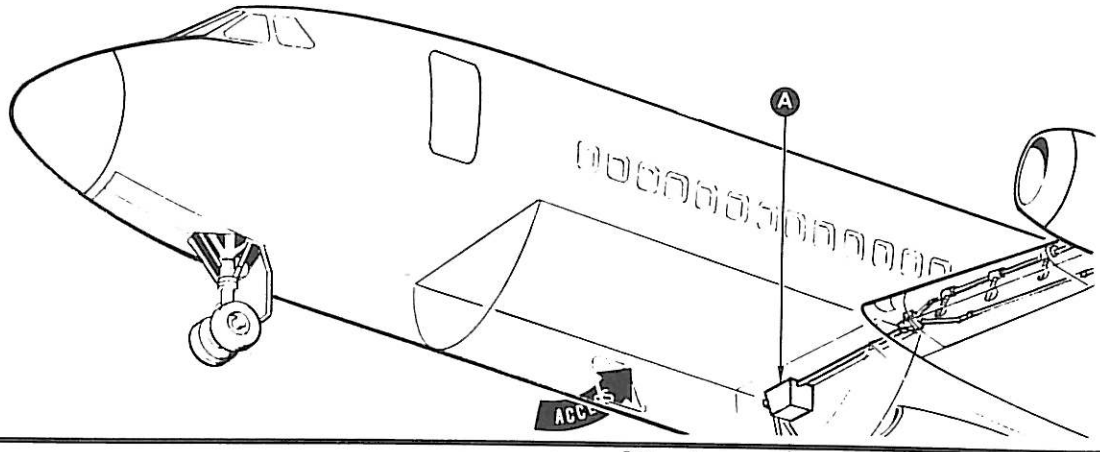
(3) Bleed flap and slat hydraulic system and perform leak test (refer to 27-9-0, Adjustment/Test Flap Control System Bleeding Procedure).

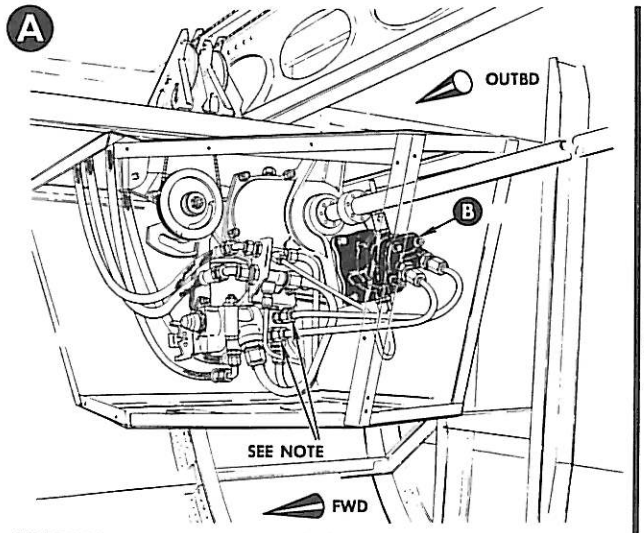
(4) Test leading edge flap and slat system (refer to 27-4-0, Adjustment/Test Leading Edge Flap and Slat Control System Functional Test).

NOTE: If a flap and slat drive motor only has been replaced and no other rigging or adjustment has been changed, check leading edge flap and slat control system operation per 27-9-0, paragraph 3.E.

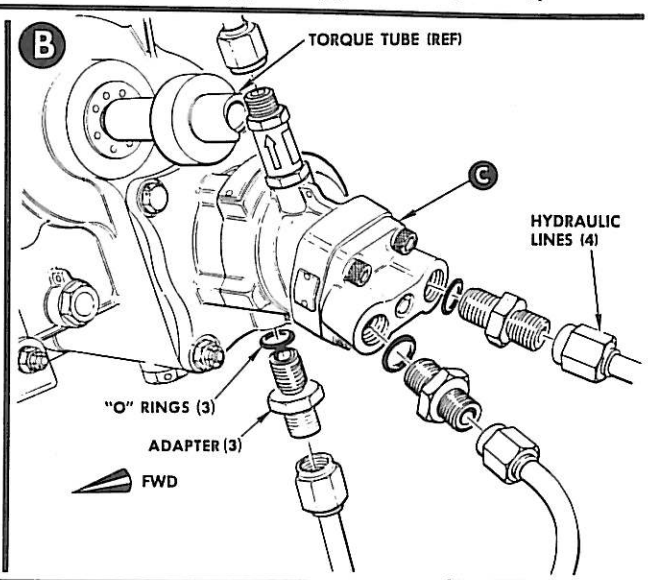
(5) Install shroud around main drive gearbox.

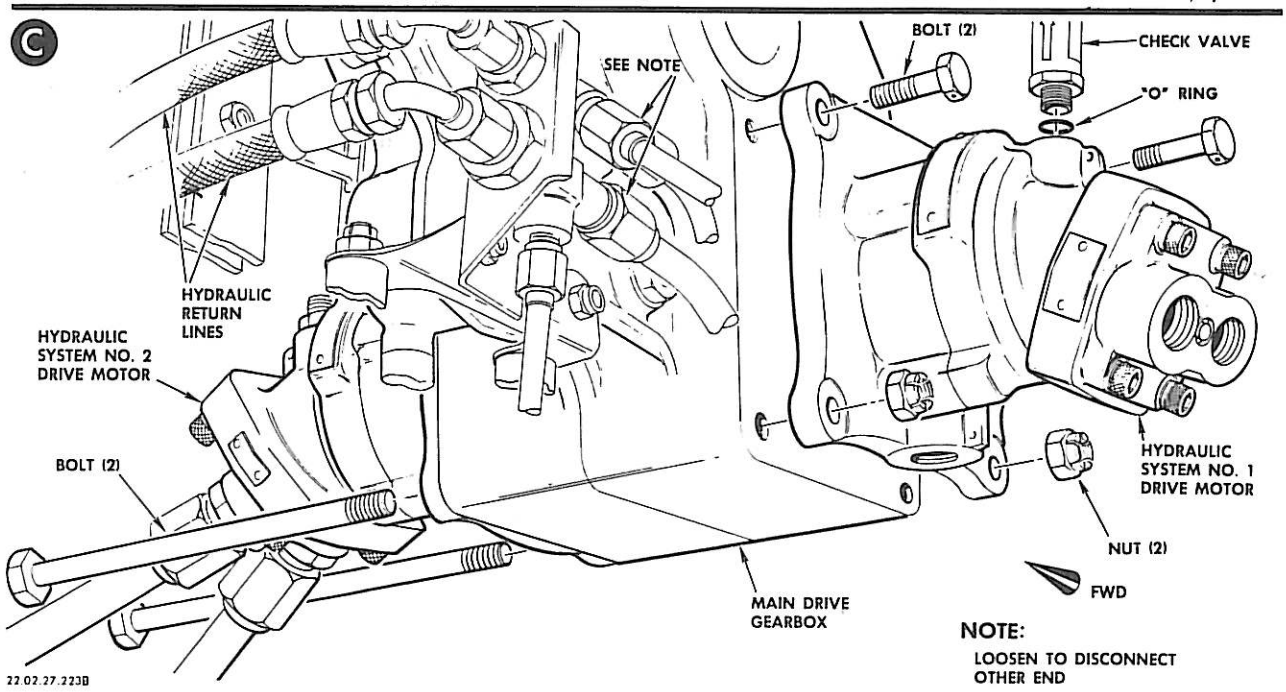
(6) Install fabric curtain in rear of forward cargo compartment (refer to Chapter 25, EQUIPMENT/FURNISHINGS).





LEADING EDGE SLAT AND FLAP MAIN DRIVE GEARBOX





Leading Edge Flap and Slat
Drive Motor Installation
Figure 201

LEADING EDGE FLAP AND SLAT CONTROL VALVE - MAINTENANCE PRACTICES

1. Removal/Installation Leading Edge Flap and Slat Control Valve (see Figure 201)

A. Equipment Required.

(1) Container for draining disconnected hydraulic lines.

B. Remove Control Valve.

NOTE: In order to position followup linkage, make sure that leading edge flaps and slats are fully extended or fully retracted before removing slat control valve.

(1) Remove fabric curtain from rear of forward cargo compartment (refer to Chapter 25, EQUIPMENT/FURNISHINGS).

(2) Remove inboard and forward sides and bottom of main drive gearbox shroud.

(3) Check that hydraulic systems are depressurized.

(4) Disconnect all hydraulic lines and control valve.

(5) Drain disconnected hydraulic lines and control valve.

(6) Disconnect control valve linkage just above control valve.

NOTE: Do not move flap control lever or control valve followup linkage after disconnecting control valve arm.

(7) Remove three bolts attaching control valve to main drive gearbox and remove valve.

(8) Clean up spilled hydraulic fluid.

C. Install Control Valve.

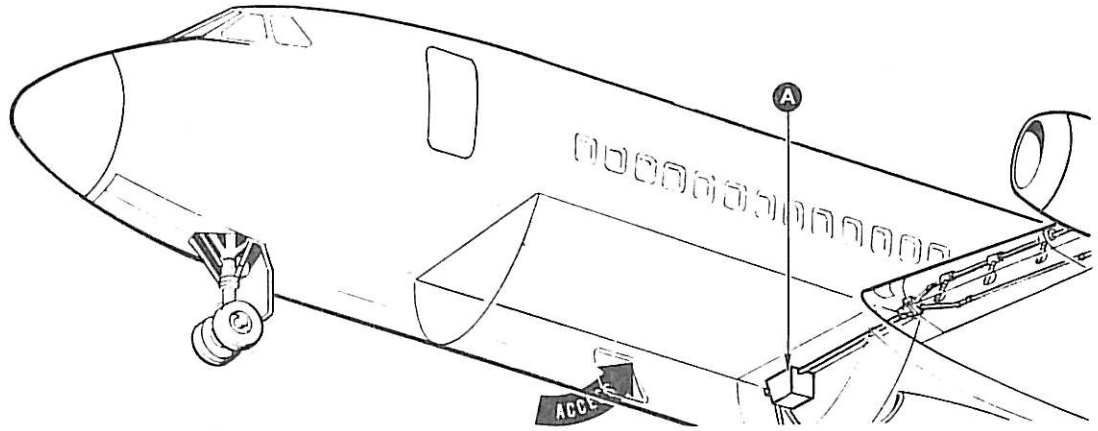
(1) Position control valve against bottom of main drive gearbox and install three mounting bolts.

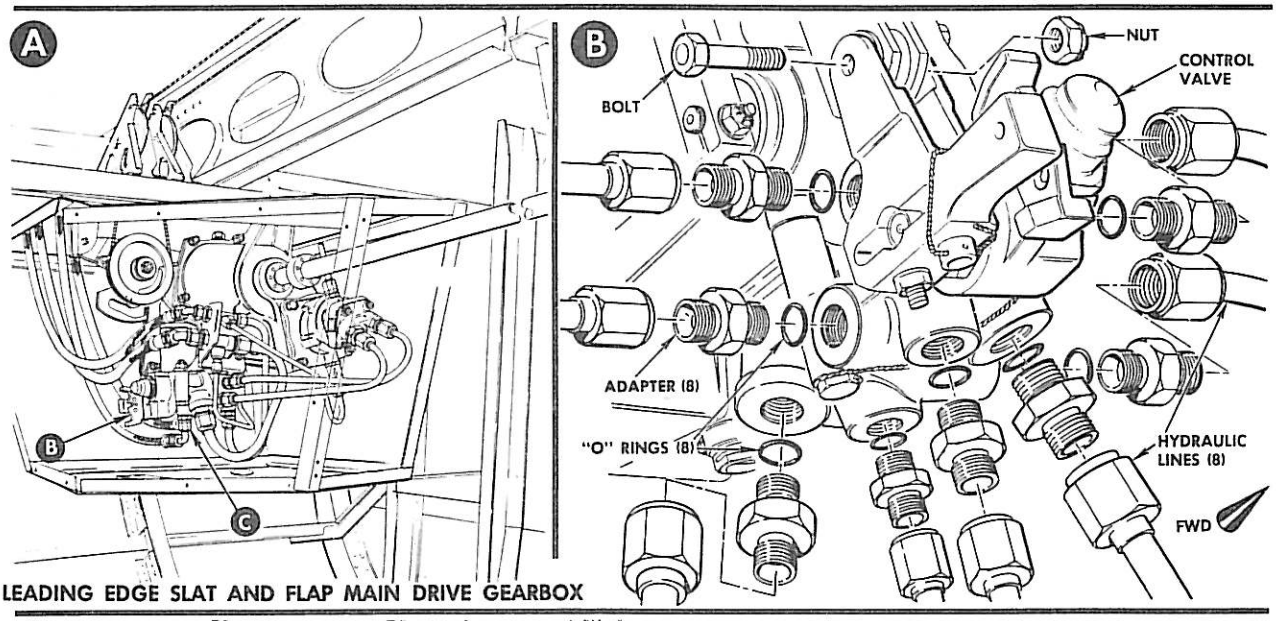
(2) Connect followup linkage to control valve arm.

NOTE: Shift control valve arm as necessary to line up with follow-up linkage. Do not move followup linkage.

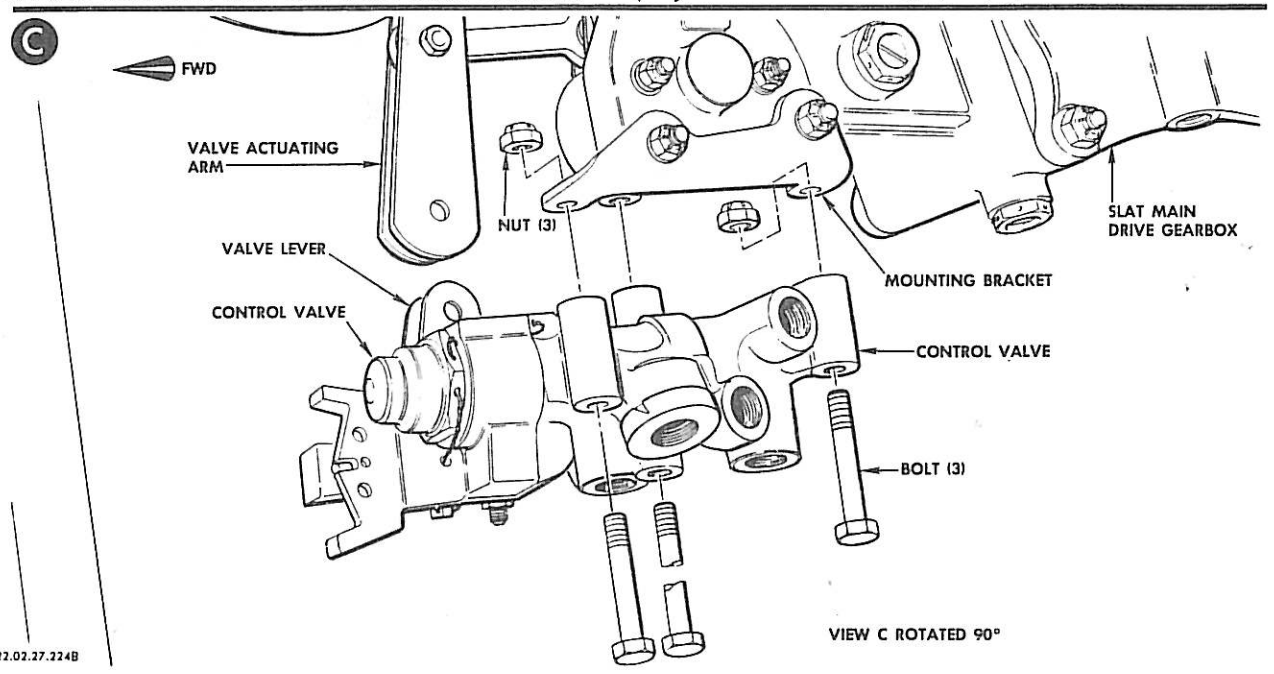
(3) Connect all hydraulic lines to control valve.

(4) Bleed flap and slat hydraulic system and perform leak test (refer to 27-4-0, Adjustment/Test Flap Control System Bleeding Procedure).





LEADING EDGE SLAT AND FLAP MAIN DRIVE GEARBOX



22.02.27.224B

Leading Edge Flap and Slat Control Valve Installation
Figure 201

(5) Test leading edge flap and slat system (refer to 27-9-0, Adjustment/Test Leading Edge Flap and Slat Control System Functional Test).

NOTE: If the leading flap and slat control valve only has been replaced and no other rigging or adjustment has been changed, check leading edge flap and slat control system operation per 27-9-0, paragraphs 3.D., 3.E., and 3.F.

(6) Install main drive gearbox shroud.

(7) Install fabric curtain in rear of forward cargo compartment (refer to Chapter 25, EQUIPMENT/FURNISHINGS).

LEADING EDGE FLAP AND SLAT REDUCTION AND ANGLE GEARBOXES - MAINTENANCE PRACTICES

1. Removal/Installation Leading Edge Flap and Slat Reduction and Angle Gearboxes (see Figure 201)

   A. Equipment Required.

      (1) Stand suitable for reaching wing leading edges.

      (2) External hydraulic power source.

      (3) External source of electrical power.

      (4) Splined adapter to adapt torque wrench to torque tubes and actuators.

   B. Remove Reduction Gearbox.

      (1) Connect external source of electrical power (refer to Chapter 24, ELECTRICAL POWER)

      (2) Close FLAP ASYM CONT circuit breaker on main circuit breaker panel.

      (3) Connect external source of hydraulic power and pressurize No. 1 and 2 hydraulic systems (refer to Chapter 29, HYDRAULIC POWER).

      CAUTION: DO NOT OPERATE FLAPS WHEN BOTH HYDRAULIC SYSTEMS ARE PRESSURIZED UNLESS ELECTRICAL POWER IS APPLIED TO THE AIRPLANE AND THE "FLAP ASYM CONT" CIRCUIT BREAKER IS CLOSED.

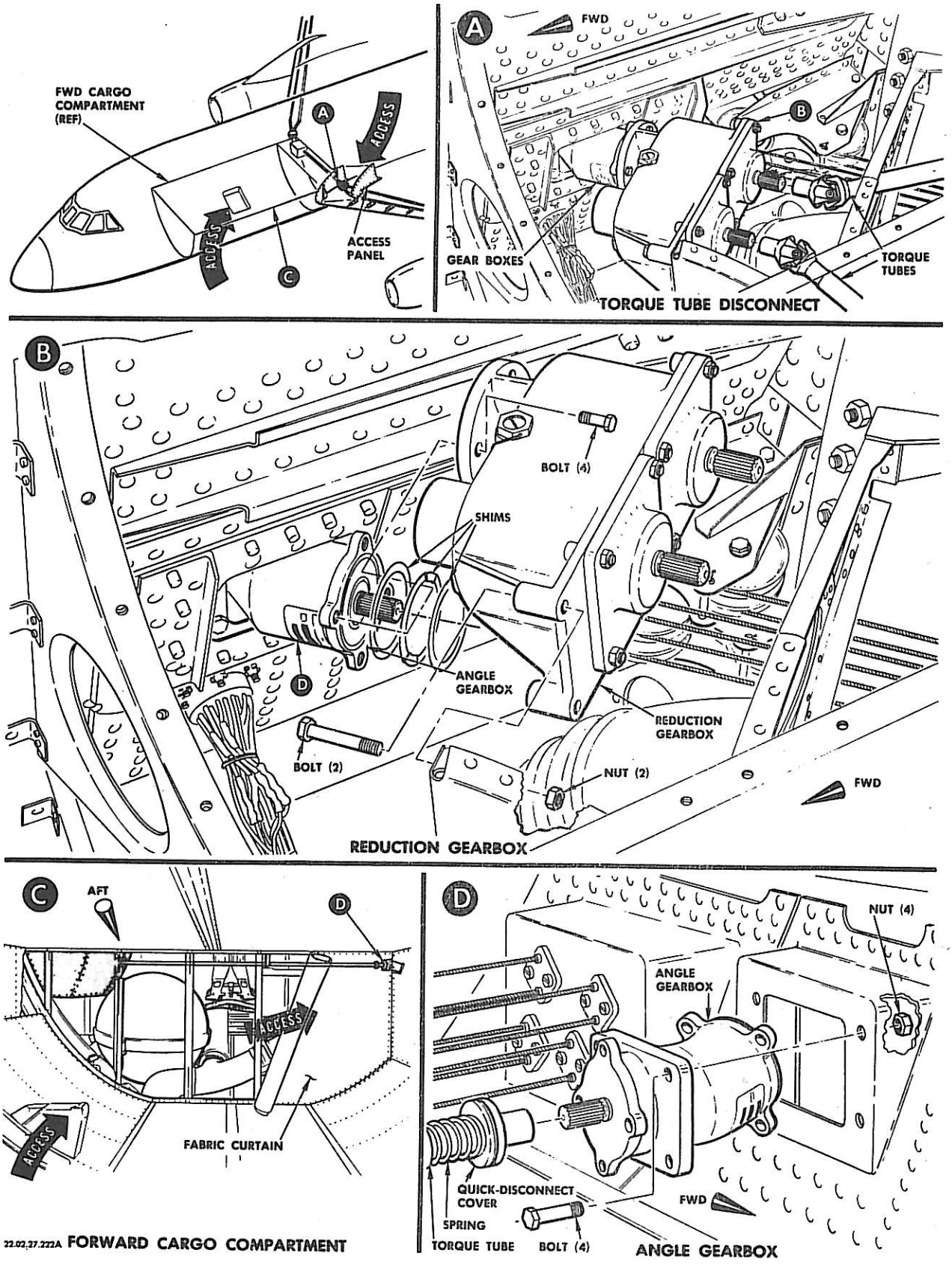
      (4) Place FLAP POWER SELECT switch in NORMAL #1 position and actuate flap control lever to 0° detent to retract leading edge flaps and slats.

      (5) Relieve hydraulic pressure in No. 1 and 2 hydraulic systems (refer to Chapter 12, SERVICING).

      (6) Remove fairing from top of wing leading edge inboard stub and access door from bottom of outboard end of stub.

      (7) Disconnect leading edge flap and slat drive torque tubes from outboard side of reduction gearbox.

      NOTE: Torque tubes may be disconnected from gearbox by forcing tube outboard against tension of torque tube spring and sliding universal joint end off of reduction gearbox output shaft. Spring is located at outboard end of torque tube segment, near outboard end of leading edge stub (refer to Removal/Installation Leading Edge Flap and Slat Drive Torque Tubes).



22.02.27.222A **FORWARD CARGO COMPARTMENT**

Leading Edge Flap and Slat Drive Reduction Gearbox and Angle Drive Gearbox Installation
Figure 201

(8) Shift torque tube segments to clear work area. Use care to avoid loss of torque tube springs.

(9) Remove two bolts attaching reduction gearbox to mounting bracket and four bolts attaching reduction gearbox to outboard end of angle gearbox. Rotate forward end of gearbox upward to clear mounting bracket, pull gearbox outboard to disengage splined coupling, and remove gearbox. Use care in removing gearbox to note proper positions of shim and spring washers between reduction and angle gearboxes.

C. Remove Angle Gearbox.

(1) Remove reduction gearbox as outlined in paragraph B.

(2) Remove fabric curtain from aft end of forward cargo compartment (refer to Chapter 25, EQUIPMENT/FURNISHINGS).

(3) Remove bottom and forward side of main drive gearbox shroud.

NOTE: Removal of shroud is not required for removal of left-hand angle gearbox.

(4) Disconnect torque tube between angle gearbox and main drive gearbox by sliding coupling back against spring tension.

(5) Remove four bolts retaining angle gearbox and remove gearbox.

NOTE: If leading edge flaps and slats are fully retracted or fully extended, flap system may be operated with leading edge flaps and slats disconnected from main drive gearbox. If leading edge flaps and slats are in any position other than fully extended or retracted, operation of flap system with leading edge flaps and slats disconnected will necessitate readjustment of leading edge flap and slat retraction, as outlined in 27-9-0, paragraphs 2.E. and 2.F., before again connecting torque tubes to main drive gearbox.

D. Install Angle Gearbox.

(1) Install angle gearbox. Make sure that gearbox output shaft is parallel to trailing edge of wing.

(2) Connect torque tube between angle bearbox and main drive gearbox.

(3) Install reduction gearbox as outlined in paragraph E.

(4) If right-hand angle gearbox was replaced, install main drive gearbox shroud.

(5) Replace fabric curtain in aft end of forward cargo compartment (refer to Chapter 25, EQUIPMENT/FURNISHINGS).

(6) Install or close any open access panels or doors and return airplane to normal configuration.

E. Install Reduction Gearbox.

(1) Position shim and spring washer (noted in step (5), paragraph B) in outboard end of angle gearbox, engage splined coupling between angle and reduction gearboxes, and press reduction gearbox against outboard end of angle gearbox. Make sure that shim and spring washer are properly positioned against outer race of bearing in angle gearbox.

(2) Rotate reduction gearbox to proper position between angle gearbox and reduction gearbox mounting bracket and install six mounting bolts (four attaching gearbox to angle gearbox flange and two to mounting bracket).

(3) Connect leading edge flap and slat drive torque tubes to outboard side of reduction gearbox (refer to Removal/Installation Leading Edge Flap and Slat Drive Torque Tubes).

(4) Adjust leading edge flap and slat retraction if required.

NOTE: If no part of leading edge flap and slat system has been moved while torque tubes were disconnected, readjustment should not be necessary. However, if main drive gearbox was operated while torque tubes were disconnected, the part of the system that was disconnected must be adjusted (refer to 27-9-0, paragraphs 2.E. and 2.F.).

(5) Check operation of leading edge flap and slat system (refer to 27-9-0, Adjustment/Test Leading Edge Flap and Slat System Functional Test).

NOTE: If a leading edge flap and slat drive reduction gearbox only has been replaced and no other rigging or adjustment has been changed, check leading edge flap and slap control system operation per 27-9-0, paragraphs 3.D. and 3.E.

(6) Install fairing on top of wing leading edge inboard stub.

SLAT DRIVE OFFSET GEARBOX - MAINTENANCE PRACTICES

1. Removal/Installation Slat Drive Offset Gearbox (see Figure 201)

A. Equipment Required.

(1) Stand suitable for reaching wing leading edge.

(2) Supports to hold leading edge in raised position.

B. Remove Slat Drive Offset Gearbox.

(1) Remove access panel from front of leading edge; access panel connects leading edge sections containing leading edge flaps No. 2 and No. 3.

(2) Remove access panel from top of leading edge sections containing leading edge flaps No. 2 and No. 3.

(3) Disconnect leading edge flap drive torque tube at inboard end of flap No. 3 (refer to Removal/Installation Leading Edge Flap and Slat Drive Torque Tubes), disconnect bleed air duct in front of leading edge, and raise leading edge containing leading edge flap No. 3 (refer to Chapter 57, WINGS). Support leading edge in raised position.

(4) Remove inboard engine pylon inboard leading edge stub.

(5) Uncouple quick-disconnect coupling at inboard side of offset gearbox (refer to Removal/Installation Leading Edge Flap and Slat Drive Torque Tubes).

(6) Disconnect pylon crossover torque tube at outboard side of offset gearbox (refer to Removal/Installation Leading Flap and Slat Drive Torque Tubes).

(7) Remove two mounting bolts and remove offset gearbox from front wing spar.

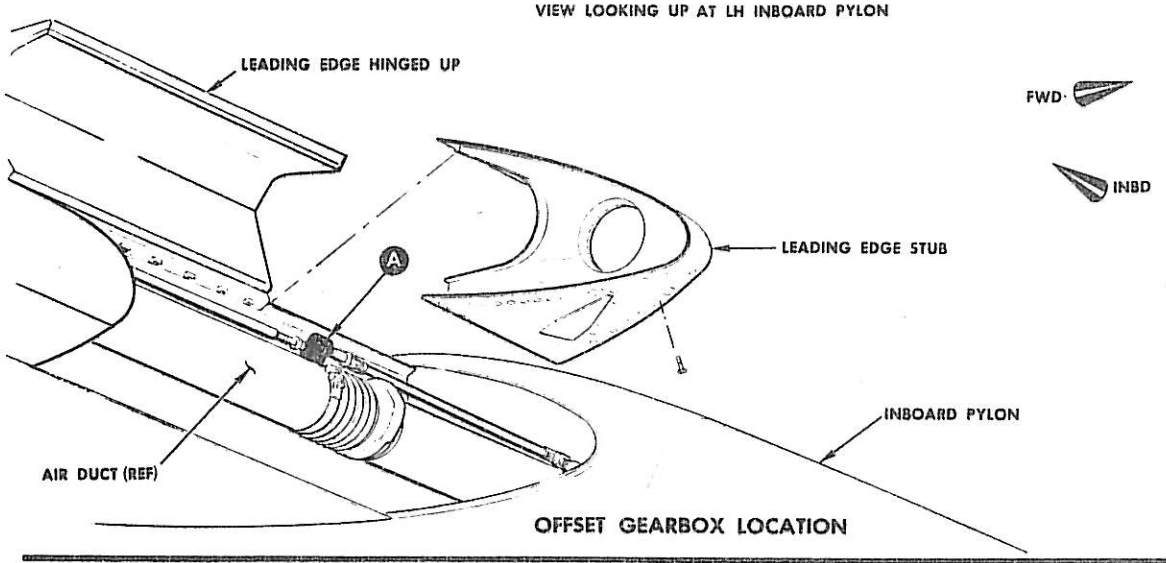
C. Install Slat Drive Offset Gearbox.

(1) Position offset gearbox on front of wing front spar and install two mounting bolts.

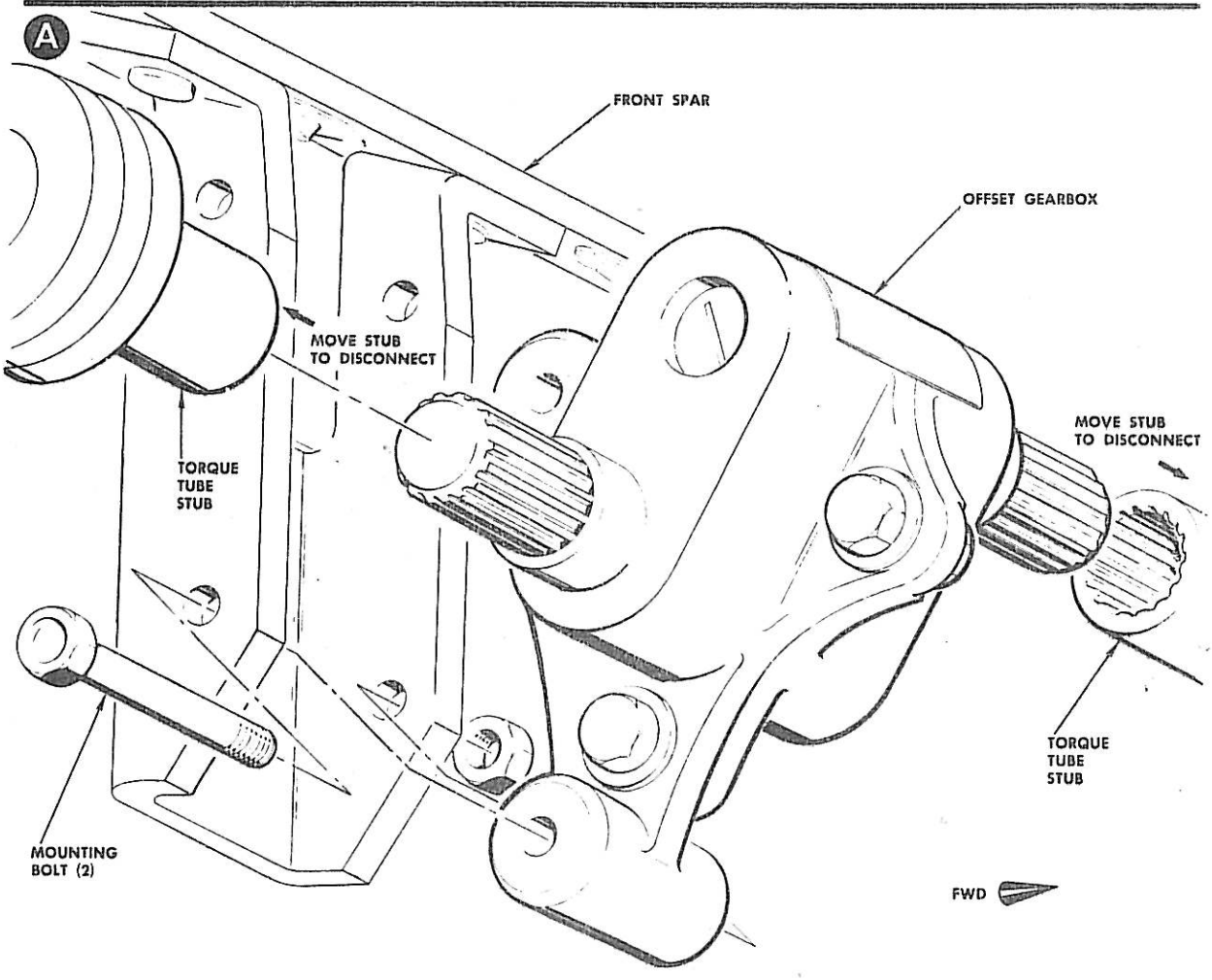
(2) Engage pylon crossover torque tube splines with splined output shaft on outboard side of offset gearbox (refer to Removal/Installation Leading Edge Flap and Slat Drive Torque Tubes).

(3) Connect quick-disconnect coupling at inboard side of offset gearbox (refer to Removal/Installation Leading Edge Flap and Slat Drive Torque Tubes).

VIEW LOOKING UP AT LH INBOARD PYLON



OFFSET GEARBOX LOCATION



OFFSET GEARBOX DISMOUNTED FROM FRONT SPAR

22.02.27.226 B

(4) If leading edge flaps and slats were at any position other than fully retracted or fully extended and if the flap and slat system was operated while torque tubes were disconnected, adjust slat retraction of all slats outboard of disconnected offset gearbox (refer to 27-9-0, paragraphs 2.E. and 2.F.)

(5) Install engine pylon leading edge stub.

(6) Lower leading edge section containing leading edge flap No. 3 (refer to Chapter 57, WINGS), connect bleed air duct, and connect leading edge flap drive torque tube. Adjust leading edge flap No. 3 retraction (refer to step (4)).

NOTE: If a leading edge slat drive offset gearbox only has been replaced and no other rigging or adjustment has been changed, check leading edge flap and slat control system operation per 27-9-0, paragraphs 3.D. and 3.E.

(7) Install access panels and return airplane to normal configuration.

LEADING EDGE SLAT TRACKS - MAINTENANCE PRACTICES

1. Removal/Installation Leading Edge Slat Tracks (see Figure 201)

A. Equipment Required.

(1) Stand suitable for reaching wing leading edge.

B. Remove Leading Edge Slat Track.

(1) Remove leading edge slat from which track is to be removed. (Refer to Removal/Installation Leading Edge Slats No. 1 and 2 or Leading Edge Slats No. 3 and 4.)

(2) Remove access door from under side of leading edge of slat and adjacent to slat track to be removed.

(3) Index mark bushing at each end of bolt through end of track. Use "Prussian Blue" dye or crayon; do not use a scribe

(4) Remove bolt attaching end of slat track to slat ribs.

(5) Remove pin, eyebolt, and barrel nut attaching aft end of track. Remove track.

C. Install Leading Edge Slat Track.

(1) Install slat track in leading edge and check roller clearance (refer to 27-9-0, Adjustment/Test Leading Edge Flap and Slat Control System Adjustment).

(2) Install barrel nut and eyebolt in slat track.

(3) Install slat track in slat. Install serrated bushings in positions indexed at removal.

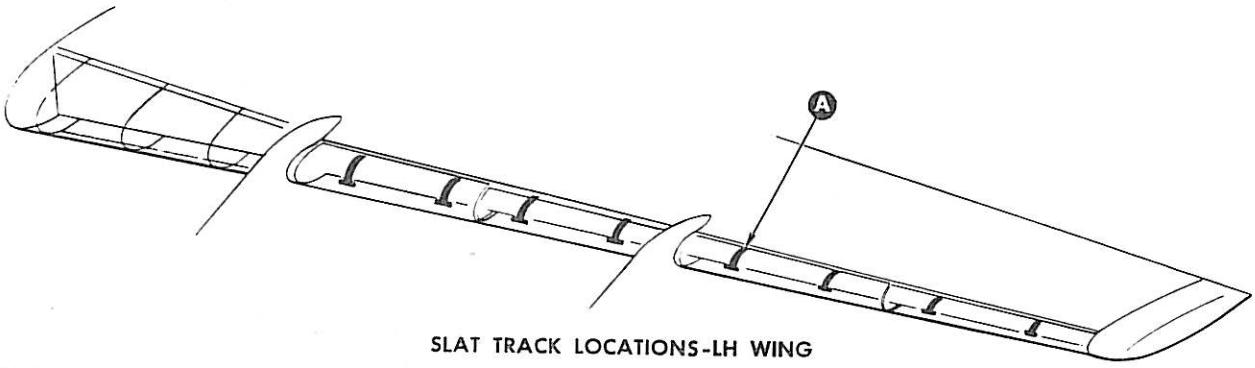
(4) Install leading edge slat (refer to Removal/Installation Leading Edge Slat No. 1 and 2 or Leading Edge Slats No. 3 and 4).

(5) Check fit and clearances between slat and leading edge; refer to 27-9-0, steps 2.A.(3) through 2.A.(5). Adjust track as required.

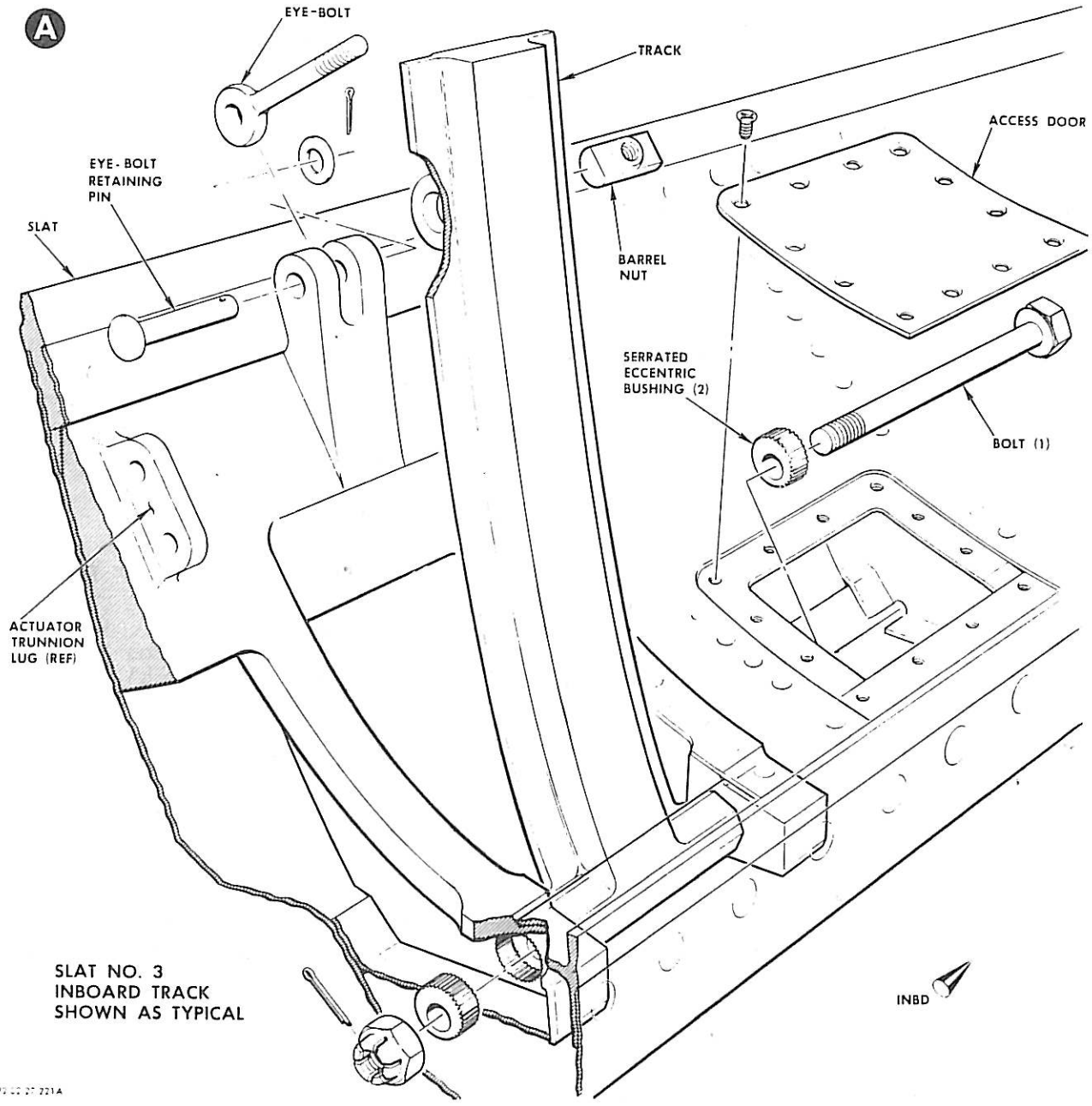
(6) Check leading edge flap and slat control system operation (refer to 27-9-0, Adjustment/Test Leading Edge Flap and Slat Control System Functional Test).

NOTE: If a leading edge slat track only has been replaced and no other rigging or adjustment has been changed, check leading edge flap and slat control system operation per 27-9-0, paragraphs 3.D. and 3.E.

(7) Install access door in slat.



SLAT TRACK LOCATIONS-LH WING



SLAT GUIDE HOOKS, ROLLERS, AND ROLLER SUPPORTS - MAINTENANCE PRACTICES

1. Removal/Installation Slat Guide Hooks, Rollers and Roller Supports (see Figure 201)

A. Equipment Required.

(1) Stand suitable for reaching the wing leading edge.

(2) External source of hydraulic power.

(3) External source of electrical power.

B. Remove Slat Guide Hook.

(1) Connect external source of electrical power (refer to Chapter 24, ELECTRICAL POWER).

(2) Close FLAP ASYM CONT circuit breaker on main circuit breaker panel and position FLAP POWER SELECT switch on NORMAL #1.

(3) Connect external source of hydraulic power to airplane and pressurize No. 1 and 2 hydraulic systems (refer to Chapter 29, HYDRAULIC POWER).

CAUTION: DO NOT OPERATE FLAPS WHEN BOTH HYDRAULIC SYSTEMS ARE PRESSURIZED UNLESS ELECTRICAL POWER IS APPLIED TO THE AIRPLANE AND THE "FLAP ASYM CONT" CIRCUIT BREAKER IS CLOSED.

(4) Actuate flap control lever to 10° detent and extend leading edge flaps and slats.

(5) Remove two retaining screws and drill out rivets.

(6) Remove hook.

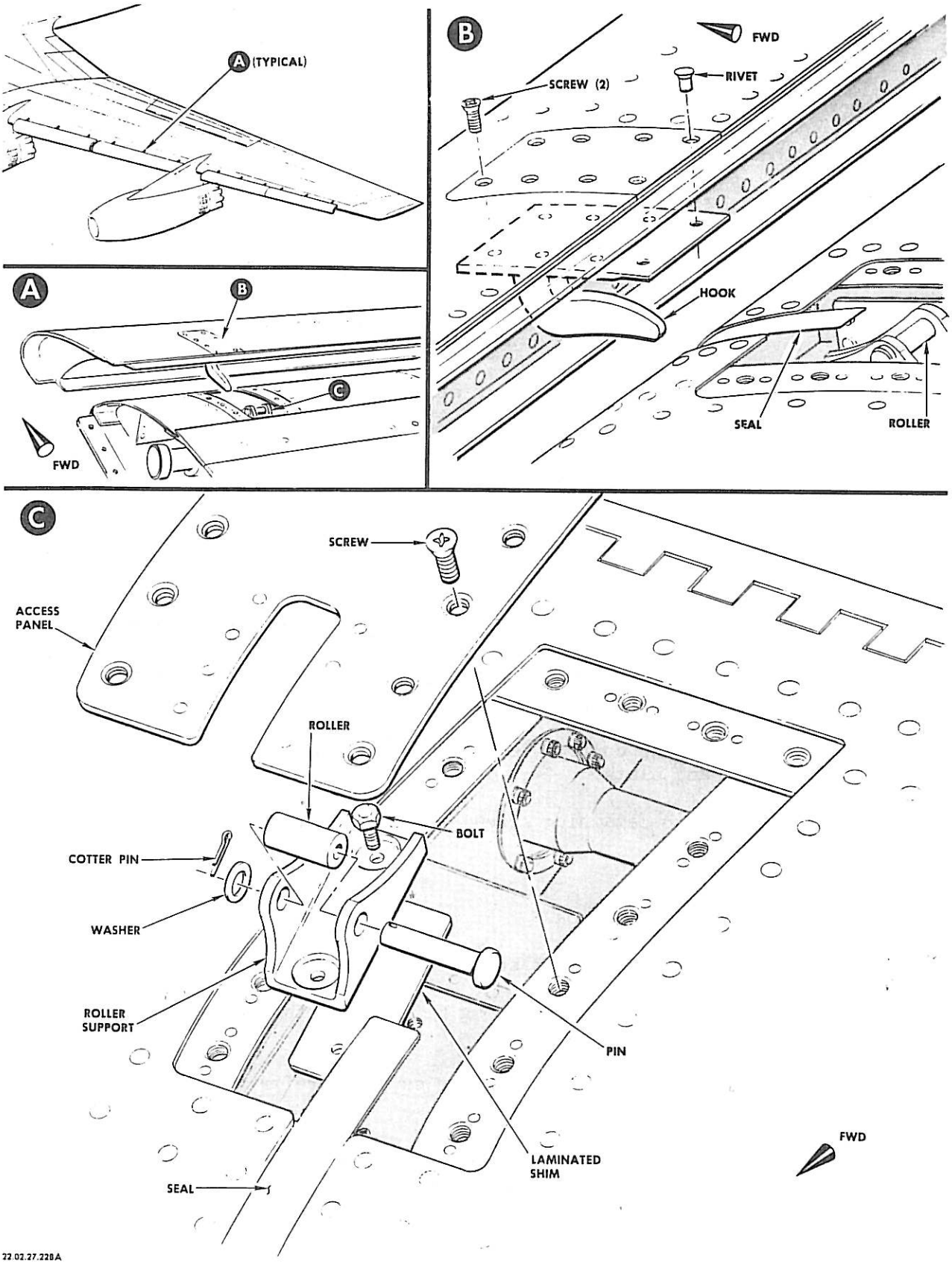
C. Install Slat Guide Hook.

(1) Position hook in slat and install two retaining screws.

(2) Install rivets in remaining holes. Rivets must be flush on both sides.

(3) Adjust slat guide hook roller support (refer to 27-9-0, paragraph 2.C.).

(4) Check leading edge flap and slat control system operation (refer to 27-9-0, Adjustment/Test Leading Edge Flap and Slat Control System Functional Test).



Slat Guide Hook, Roller, and Roller Support Installation
Figure 201

NOTE: If a slat guide hook only has been replaced and no other rigging or adjustment has been changed, check leading edge flap and slat control system operation per 27-9-0, paragraph 3.D.

(5) Return airplane to normal configuration.

D. Remove Slat Guide Hook Roller.

(1) Perform steps B.(1) through B.(4).

(2) Remove slotted access door from top of leading edge.

(3) Remove cotter pin, clevis pin, and guide hook roller. If clearance is insufficient to remove clevis pin, remove guide hook roller support.

E. Install Slat Guide Hook Roller.

(1) Position guide hook roller in roller support and install clevis pin and cotter pin.

(2) Install slotted access door.

(3) Move flap control lever to 0° detent. Slats will retract.

(4) Return airplane to normal configuration.

F. Remove Slat Guide Hook Roller Support.

(1) Perform steps B.(1) through B.(4).

(2) Remove slotted access door from top of leading edge.

(3) Remove two bolts retaining guide hook roller support and remove support. Tag and identify shims used under roller support.

NOTE: When guide hook roller access doors are removed from slat No. 4 leading edge section, guide hook slot spring seal will fall into leading edge. The seal is retained by the three screws retaining the forward edge of the access door. The seals used under the other three slats are welded to the leading edge.

G. Install Slat Guide Hook Roller Support.

(1) Position guide hook roller support and shims in leading edge and install retaining bolts. Make sure that total thickness of shims is same as total thickness of shims removed.

(2) Adjust clearance between guide hook and guide hook roller support (refer to Adjustment/Test Leading Edge Flap and Slat Control System Adjustment).

(3) Install slotted access door.

(4) Move flap control lever to 0° detent to retract slats.

(5) Return airplane to normal configuration.

INTRANSIT AND EXTEND INDICATOR LIGHT SWITCHES - MAINTENANCE PRACTICES

1. Removal/Installation Intransit and Extend Indicator Light Switches (see Figure 201)

A. Equipment Required.

(1) Stand suitable for reaching the wing leading edge.

(2) External source of electrical power.

(3) External source of hydraulic power.

B. Remove Slat Intransit Indicator Light Switch.

(1) Connect external source of electrical power (refer to Chapter 24, ELECTRICAL POWER).

(2) Connect external source of hydraulic power to airplane and pressurize No. 1 and 2 hydraulic systems (refer to Chapter 29, HYDRAULIC POWER).

CAUTION: DO NOT OPERATE FLAPS WHEN BOTH HYDRAULIC SYSTEMS ARE PRESSURIZED UNLESS ELECTRICAL POWER IS APPLIED TO THE AIRPLANE AND THE "FLAP ASYM CONT" CIRCUIT BREAKER IS CLOSED.

(3) Close FLAP ASYM CONT circuit breaker on main circuit breaker panel and position FLAP POWER SELECT switch on NORMAL #1.

(4) Actuate flap control lever to 10° detent and extend leading edge flaps and slats.

(5) Open RH and LH L.E. SLAT POSITION WARN circuit breakers.

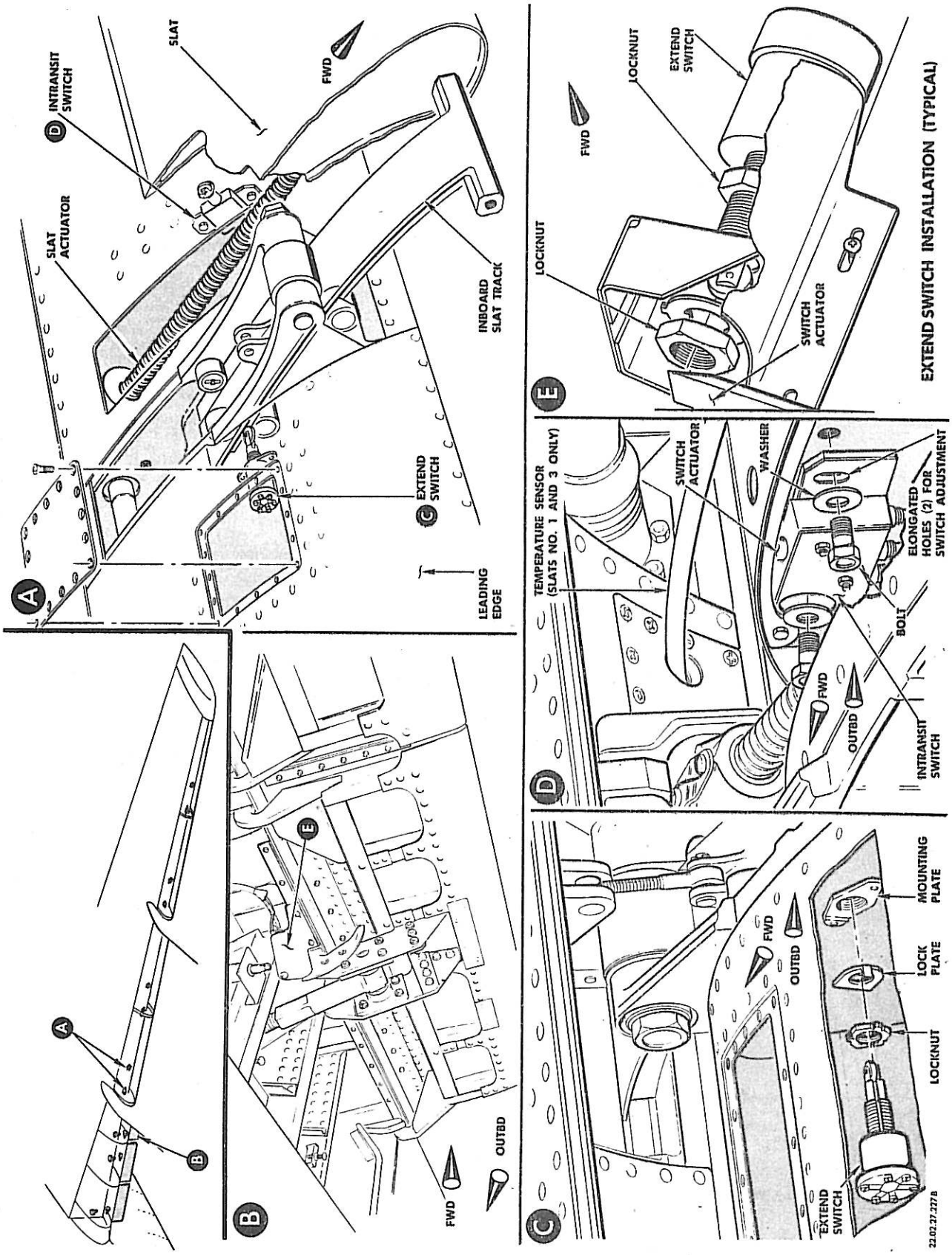
(6) Disconnect wiring from intransit indicator light switch to be removed.

NOTE: A slat intransit indicator light switch is installed adjacent to the inboard jack screw of each slat. The switch plunger extends up against a switch actuating lever which, in turn, extends through the leading edge skin. The lever is depressed by the underside of the slat in the retracted position.

(7) Remove two mounting bolts and remove switch assembly from leading edge.

(8) Remove actuating lever pivot bolt and remove lever from switch assembly.

(9) Remove two screws and remove switch from mounting bracket.



Intransit and Extend Indicator
Light Switch Installation
Figure 201

C. Install Slat Intransit Indicator Light Switch.

(1) Assemble intransit switch and switch mounting bracket.

(2) Position switch actuating lever in switch assembly and install actuating lever pivot bolt.

(3) Position switch assembly on outboard side of inboard slat actuator jack screw and install two mounting bolts. Tighten mounting bolts during switch adjustment.

(4) Connect indicator circuit wiring.

(5) Adjust intransit indicator light switch (refer to 27-9-0, steps 2.D.(1) through 2.D.(3).

(6) Check leading edge flap and slat control system operation (refer to 27-9-0, Adjustment/Test Leading Edge Flap and Slat Control System Functional Test).

NOTE: If a slat intransit indicator light switch only has been replaced and no other rigging or adjustment has been changed, check leading edge flap and slat control system operation per 27-9-0, paragraph 3.H.

D. Remove Slat Extend Indicator Light Switch.

(1) Pressurize airplane's No. 1 and No. 2 hydraulic systems (refer to Chapter 29, HYDRAULIC POWER).

(2) Move flap control handle to 10° detent. Slats will extend.

(3) Remove access door from top of leading edge inboard of inboard slat track.

(4) Open RH and LH L.E. SLAT POSITION WARN circuit breakers.

(5) Disconnect wiring from extend indicator light switch.

NOTE: An extend indicator light switch is installed in the inboard slat track roller support of each inboard slat track. The switch actuating plunger extends through the support and is actuated by the side of the slat track in any position other than fully extended. Switch contacts are closed when switch is deactuated.

(6) Loosen lock nut on threaded portion of switch and screw switch out of switch mounting plate.

E. Install Slat Extend Indicator Light Switch.

(1) Screw switch into switch mounting plate.

(2) Adjust extend indicator light switch; refer to 27-9-0, step 2.D.(4).

(3) Connect indicator circuit wiring.

(4) Close RH and LH L.E. SLAT POSITION WARN circuit breakers.

(5) Check leading edge flap and slat control system operation (refer to 27-9-0, Adjustment/Test Leading Edge Flap and Slat Control System Functional Test).

NOTE: If a slat extend indicator light switch only has been replaced and no other rigging or adjustment has been changed, check leading edge flap and slat operation per 27-9-0, paragraph 3.H.

(6) Extend slats, tighten switch lock nut, install access door, and retract slats.

F. Remove Leading Edge Flap Intransit Indicator Light Switch.

(1) Pressurize airplane's No. 1 and No. 2 hydraulic systems (refer to Chapter 29, HYDRAULIC POWER).

(2) Move flap control lever to 10° detent to extend leading edge flaps.

(3) Open RH and LH L.E. SLAT POSITION WARN circuit breakers.

(4) Disconnect wiring from intransit indicator light switch.

NOTE: An intransit indicator light switch is mounted near the inboard end of each flap. The switch plunger extends straight down and is actuated by the top of the leading edge flap in the retracted position.

(5) Remove switch mounting nut and remove switch.

G. Install Leading Edge Flap Intransit Indicator Light Switch.

(1) Install switch and move flap control lever to 0° detent to retract leading edge flaps. Adjust switch (refer to Adjustment/Test Leading Edge Flap and Slat Control System Adjustment).

(2) Move flap control lever to 10° detent to extend leading edge flaps, and connect indicator circuit wiring.

(3) Close RH and LH L.E. SLAT POSITION WARN circuit breakers.

(4) Check leading edge flap and slat control system operation (refer to 27-9-0, Adjustment/Test Leading Edge Flap and Slat Control System Functional Test).

NOTE: If a leading edge flap intransit indicator light switch only has been replaced and no other rigging or adjustment has been changed, check leading edge flap and slat control system operation per 27-9-0, paragraph 3.H.

(5) Extend leading edge flaps, lockwire switch mounting nuts, install access door, and retract flaps.

(6) Disconnect hydraulic power unit and return airplane to normal configuration.

H. Remove Leading Edge Flap Extend Indicator Light Switch.

(1) Pressurize airplane's No. 1 and No. 2 hydraulic systems (refer to Chapter 29, HYDRAULIC POWER).

(2) Move flap control lever to 10° detent to extend leading edge flaps.

(3) Open RH and LH L.E. SLAT POSITION WARN circuit breakers.

(4) Disconnect wiring from extend indicator light switch.

NOTE: An extend indicator light switch is installed in the leading edge at the forward inboard corner of each outboard flap. The switch actuating plunger extends outboard and is actuated by a cam arm when the flap is fully extended.

(5) Remove switch mounting nut and remove switch.

I. Install Leading Edge Flap Extend Indicator Light Switch.

(1) Install switch and move flap control lever to 0° detent to retract leading edge flaps. Adjust switch; refer to 27-9-0, step 2.D.(6).

(2) Move flap control lever to 10° detent to extend leading edge flaps and connect indicator circuit wiring.

(3) Close RH and LH L.E. SLAT POSITION WARN circuit breakers.

(4) Check operation of leading edge flap control system (refer to 27-9-0, Adjustment/Test Leading Edge Flap and Slat Control System Functional Test).

NOTE: If a leading edge flap extend indicator light switch only has been replaced and no other rigging or adjustment has been changed, check leading edge flap and slat control system operation per 27-9-0, paragraph 3.H.

(5) Extend leading edge flaps, lockwire switch mounting nuts, install access door, and retract flaps.

(6) Disconnect hydraulic power unit and return airplane to normal configuration.

LEADING EDGE FLAP ACTUATOR - MAINTENANCE PRACTICES

1. Removal/Installation Leading Edge Flap Actuator (see Figure 201)

A. Equipment Required.

(1) Stand suitable for reaching wing leading edge.

(2) Splined male adapter for adapting torque wrench to flap drive torque tubes or flap actuator gearboxes.

(3) Torque wrench.

(4) External electric power source.

(5) External hydraulic power source.

B. General.

The installation of leading edge flap actuators is identical for all actuators except for the number of actuators used for each leading edge flap. Removal and installation instructions given in paragraphs C and D apply to any leading edge flap actuator.

C. Remove Leading Edge Flap Actuator.

(1) Connect external source of electrical power (refer to Chapter 24, ELECTRICAL POWER).

(2) Connect external source of hydraulic power to airplane and pressurize No. 1 and 2 hydraulic systems (refer to Chapter 29, HYDRAULIC POWER)

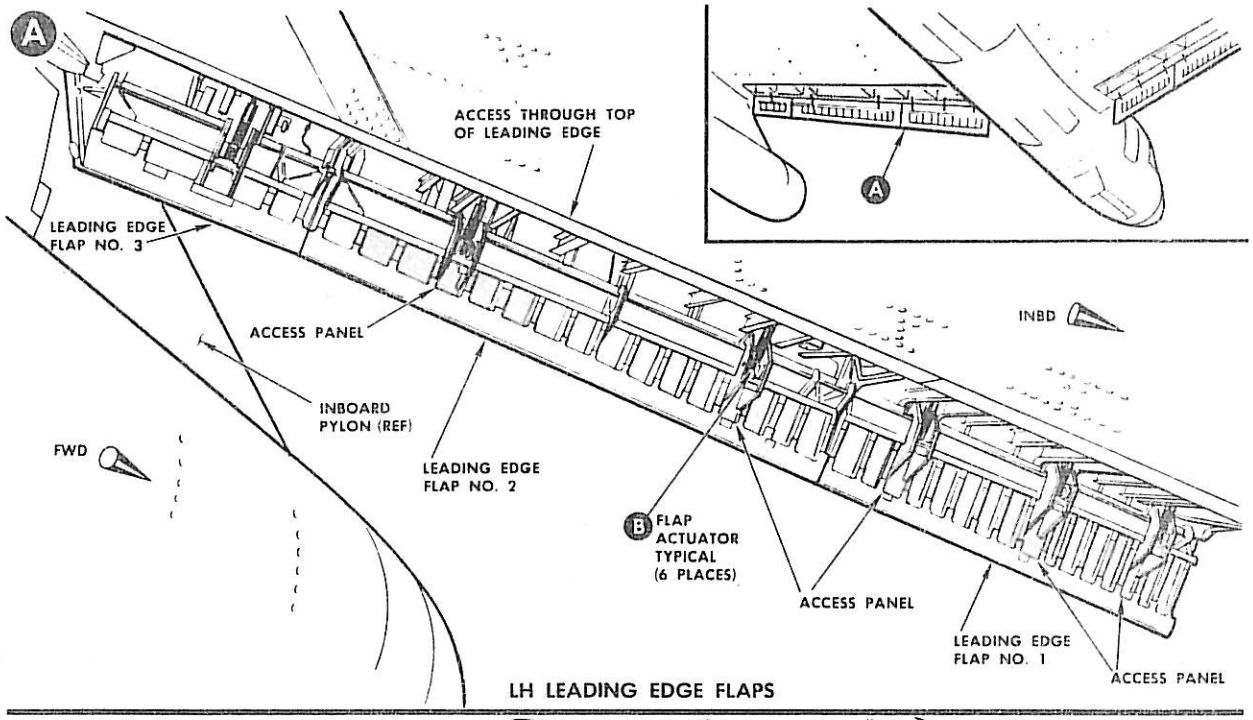
CAUTION: DO NOT OPERATE FLAPS WHEN BOTH HYDRAULIC SYSTEMS ARE PRESSURIZED UNLESS ELECTRICAL POWER IS APPLIED TO THE AIRPLANE AND THE "FLAP ASYM CONT" CIRCUIT BREAKER IS CLOSED.

(3) Close FLAP ASYM CONT circuit breaker on main circuit breaker panel and position FLAP POWER SELECT switch on NORMAL #1.

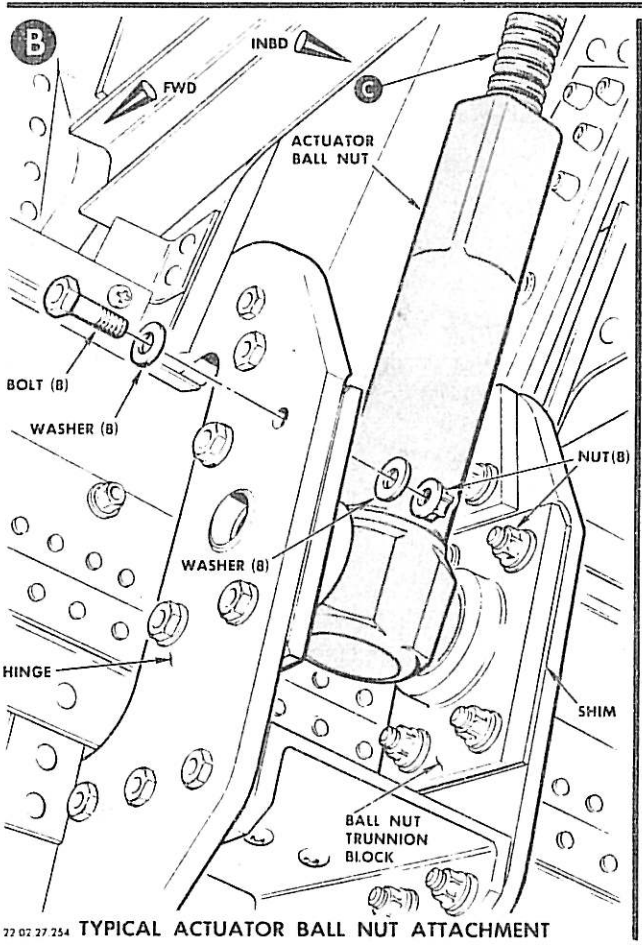
(4) Actuate flap control lever to 10° detent and extend leading edge flaps and slats.

(5) If leading edge flaps and slats do not extend, relieve hydraulic system pressure (refer to Chapter 12, SERVICING).

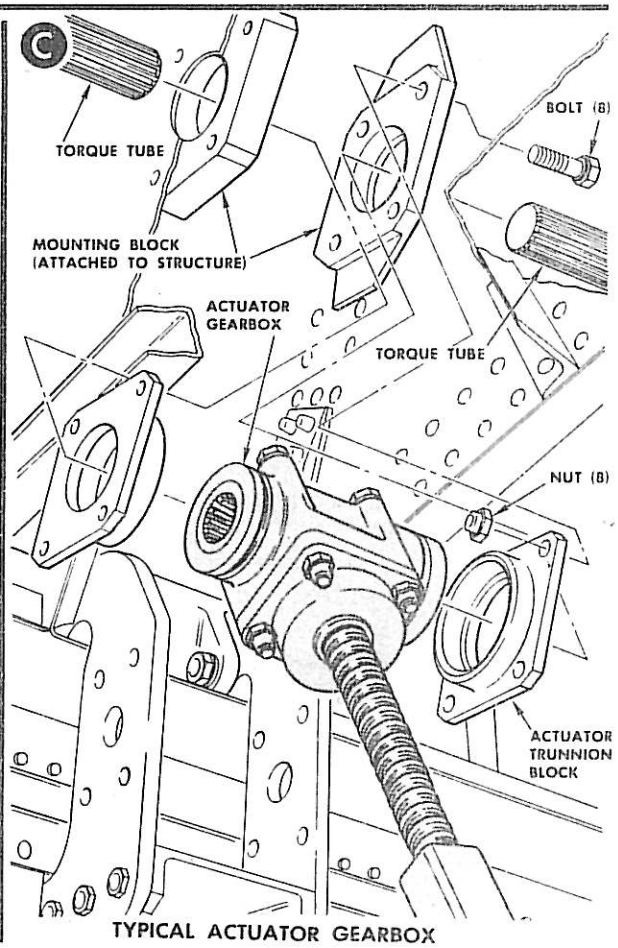
(6) After isolating defective actuator (refer to Leading Edge Flap and Slat Control System - Trouble Shooting), disconnect torque tube at inboard end of flap to which defective actuator is attached (refer to Removal/Installation Leading Edge Flap and Slat Drive Torque Tubes).



LH LEADING EDGE FLAPS



22 02 27 254 TYPICAL ACTUATOR BALL NUT ATTACHMENT



TYPICAL ACTUATOR GEARBOX

(7) Pressurize airplane hydraulic systems and move flap control lever to 0^{o} detent to retract remainder of leading edge flaps and slats. Hang a warning sign on flap control lever. Sign should read "Do not operate flap system."

(8) If defective actuator is jammed with attached flap in or near the retracted position, remove access panel from above or below actuator.

NOTE: Access panels are provided in leading edge flaps No. 1 and No. 2 for each actuator. Access panels are provided in the top of the leading edge above flap No. 2 outboard actuator and above flap No. 3 actuator.

(9) Remove eight bolts attaching actuator trunnions to flap ribs. Disconnect torque tubes on each side of defective actuator and pull splined torque tube ends out of actuator gearbox (refer to Removal/Installation Leading Edge Flap and Slat Drive Torque Tubes).

(10) If flap was not extended, step (5), disconnect torque tube at outboard end of flap and rotate torque tubes manually to extend flap. Splined adapters and wrenches should be used. If manually extending flap No. 1, make sure that the remaining two actuators are extended evenly.

(11) Remove eight bolts attaching actuator gearbox to leading edge ribs. Remove actuator. Note position of spacer between gearbox and rib.

D. Install Leading Edge Flap Actuator.

(1) Position actuator gearbox between leading edge ribs, install spacer in position noted at removal, and install eight mounting bolts.

(2) Run actuator ball nut out toward end of jack screw. For flaps No. 1 and No. 2, ball nut should be run out to same position as other ball nuts. For flap No. 1, make sure that other two actuator ball nuts are same distance from actuator gearbox so there is no twist in flap.

(3) Make sure that ball return tubes are on forward side of ball nut (in vertical position) and install ball nut trunnions. Make sure that shim is installed in position noted during removal and install eight mounting bolts.

(4) Using splined male adapter and wrench, retract disconnected leading edge flaps. Adjust flap retraction; refer to 27-9-0, paragraph 2.F.).

CAUTION: IN MANUALLY RETRACTING FLAPS NO. 1 AND NO. 2 WITH TORQUE TUBES DISCONNECTED, MAKE SURE THAT THE THREE ACTUATORS IN FLAP NO. 1 OR THE TWO ACTUATORS IN FLAP NO. 2 ARE RETRACTED AT THE SAME SPEED TO PREVENT ANY TWISTING OR WARPING OF THE FLAP.

NOTE: If leading edge flap No. 1 was disconnected from leading edge flap and slat drive system, flaps No. 1, No. 2, and No. 3 should be retracted manually and adjusted. If flap No. 1 was disconnected, flaps No. 2 and No. 3 should be retracted manually. If only flap No. 3 was disconnected, only flap No. 3 need be retracted manually. Flap retraction must be adjusted for each flap manually retracted.

(5) Insert splined torque tube ends into actuators and connect torque tubes between actuators, between flaps, and between flaps and main drive gearbox.

(6) Pressurize airplane hydraulic systems (refer to Chapter 29, HYDRAULIC POWER). Check operation of leading edge flap and slat system (refer to 27-9-0, Adjustment/Test Leading Edge Flap and Slat Control System Functional Test).

NOTE: If a flap actuator only has been replaced and no other rigging or adjustment has been changed, check leading edge flap and slat control system operation per 27-9-0, paragraphs 3.D. and 3.E.

(7) Relieve hydraulic system pressure (refer to Chapter 12, SERVICING), disconnect hydraulic power unit, install access panels, and return airplane to normal configuration.

LEADING EDGE SLAT NO. 1 AND 2 ACTUATORS - MAINTENANCE PRACTICES

1. Removal/Installation Leading Edge Slat No. 1 and 2 Actuators (see Figure 201)

A. Equipment Required.

(1) Hydraulic power unit capable of delivering eight gallons per minute at 3000 psig.

(2) Source of external electrical power.

(3) Stand suitable for reaching wing leading edge.

(4) Fixture suitable for supporting leading edge in raised position.

(5) Splined male adapter to adapt torque wrench to end of slat drive torque tube.

(6) Spring scale.

B. Remove Slat No. 1 or 2 Actuator.

(1) Remove accesses at inboard end of slat No. 1 and outboard end of slat No. 2, disconnect wiring and air duct, disconnect torque tube (refer to Removal/Installation Leading Edge Flap and Slat Drive Torque Tubes), and raise leading edge sections under slats No. 1 and 2 (refer to Chapter 57, WINGS).

NOTE: Due to the difficulty of disconnecting leading edge sections at the break between slats No. 1 and 2, it is suggested that the two leading edge sections be raised simultaneously.

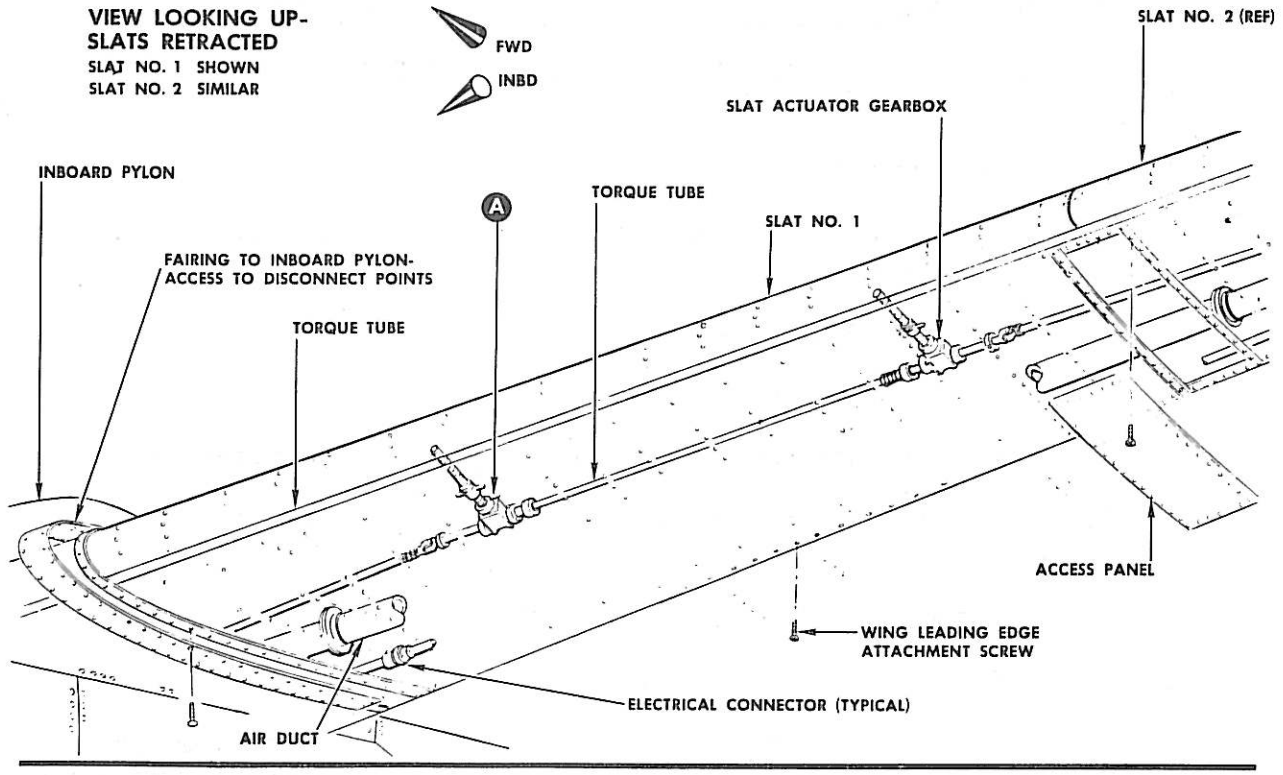
(2) Install two supporting fixtures for each section of leading edge. Make sure that fixtures are secure.

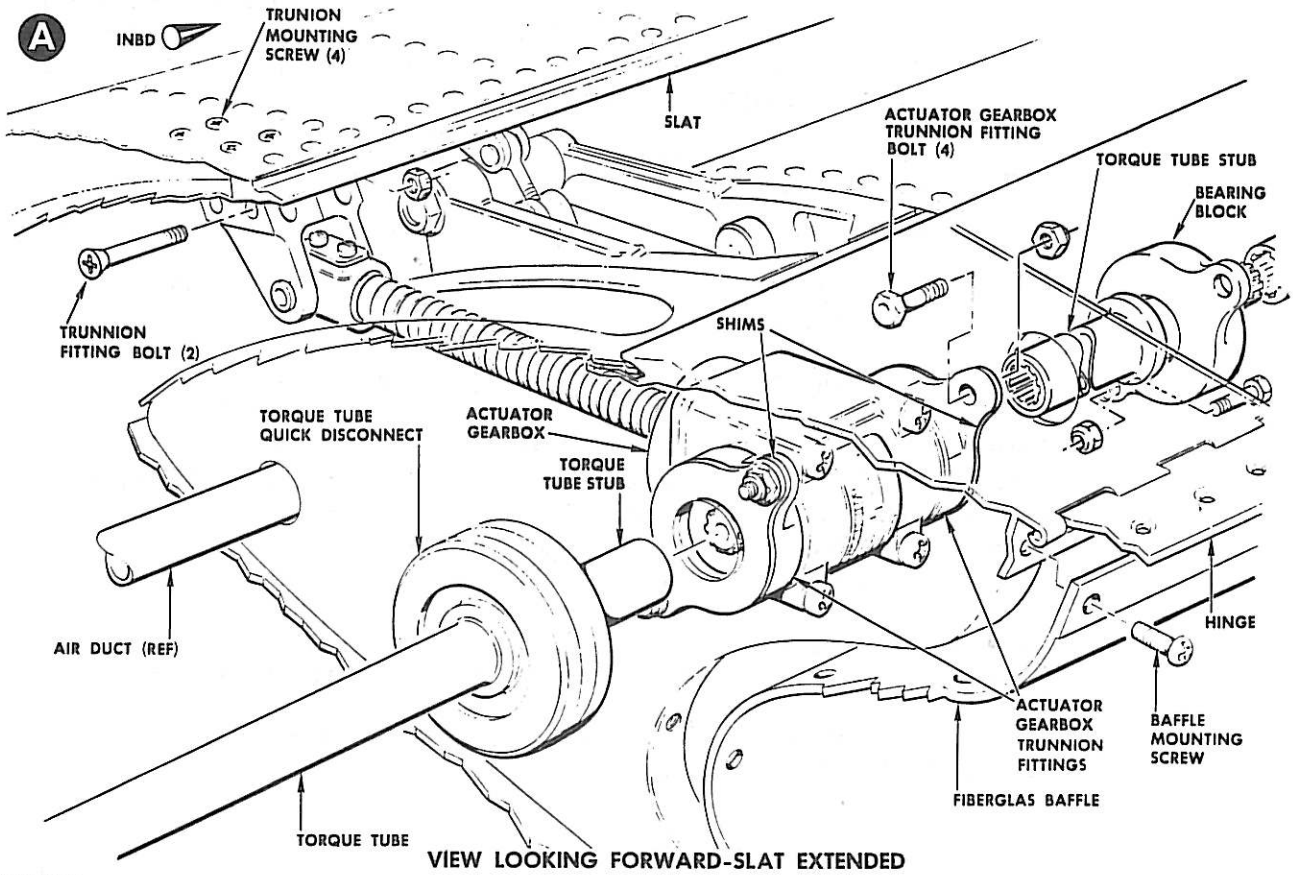
(3) Remove fiberglas baffles from rear of leading edge.

(4) Extend slats No. 1 and 2. Use male splined adapter and a speed wrench, or hand drill. Extend slats until actuator ball nuts contact ends of jack screws. If slats are jammed, disconnect defective actuator from slat and from torque tubes and extend slat with other actuator.

(5) Disconnect torque tubes as required to remove actuator (refer to Removal/Installation Leading Edge Flap and Slat Drive Torque Tubes).

(6) Install wood blocks between slat and leading edge to support slat when actuator is removed.





VIEW LOOKING FORWARD-SLAT EXTENDED

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(7) Remove screws attaching trunnion fittings to slat. Remove trunnion fitting halves from ball nut and install loosely on slat for use at installation. Note position of filler shim used between slat and trunnion fittings.

(8) Remove torque tube sections from each end of actuator gearbox. (Tag sections for use at installation.)

(9) Remove two bolts from each actuator gearbox trunnion and remove actuator with trunnions through rear of leading edge. Remove trunnions from gearbox.

C. Install Slat No. 1 or 2 Actuator.

(1) Install gearbox trunnions on actuator and install actuator through rear of leading edge. Make sure that top of gearbox, stamped "This side up", is facing top of leading edge.

(2) Install actuator gearbox trunnion fitting bolts. Attach spring scale to forward end of actuator jack screw and move actuator through full arc of movement. Force required to move actuator shall not exceed three pounds.

(3) If force required is greater than three pounds, install shims between actuator gearbox trunnion fittings and ribs to provide proper alignment of fittings. Shims may be thinned or tapered as necessary.

(4) Run actuator ball nut out to end of jack screw. Install trunnion fitting halves on ball nut trunnions and install two screws through trunnion fitting halves. Install filler shim between slat and trunnion fittings and install four screws to attach slat to trunnion fittings. Make sure that ball return tubes are on upper side of ball nut.

(5) Install splined torque tube section in gearbox.

(6) Make sure that both slat actuator ball nuts are against the ends of the jack screws so that when slat is retracted, edges of slat will mate properly with leading edge. Connect torque tube between actuators.

(7) Retract slats No. 1 and 2 to approximately 80 percent of retract travel using splined adapter and splined coupling.

(8) Tap actuator to allow it to position correctly between trunnion fittings at gearbox. Measure and record distance between trunnion shoulders and trunnion fitting bushings.

(9) Fully extend slats and repeat step (8).

(10) Distances measured in steps (8) and (9) should be the same within ±0.15 inches.

(11) If distances are not in tolerance, check actuator ball nut trunnion fittings for alignment with actuator. Bushings in fittings must not bind on ball nut trunnions. Check actuator for parallel installation with slat tracks. Prepare laminated shims and install between gearbox trunnion fittings and rib as necessary to align actuator, and decrease distance between gearbox trunnion shoulder and trunnion fittings to 0.03 (+0.001, -0.01) inch.

(12) Retract slats No. 1 and 2 using splined male adapter and splined coupling. Check fits and clearances (refer to Removal/Installation Leading Edge Slats No. 1 and 2).

(13) Disconnect torque tube between slats No. 1 and 2. Adjust slat retraction (refer to 27-9-0, paragraph 2.E.).

(14) Connect torque tube between slats No. 1 and 2 and install fiberglas baffles in rear of leading edges.

(15) Connect external source of electrical power (refer to Chapter 24, ELECTRICAL POWER).

(16) Connect external source of hydraulic power to airplane and pressurize No. 1 and 2 hydraulic systems (refer to Chapter 29, HYDRAULIC POWER).

CAUTION: DO NOT OPERATE FLAPS WHEN BOTH HYDRAULIC SYSTEMS ARE PRESSURIZED UNLESS ELECTRICAL POWER IS APPLIED TO THE AIRPLANE AND THE "FLAP ASYM CONT" CIRCUIT BREAKER IS CLOSED.

(17) Close FLAP ASYM CONT circuit breaker on main circuit breaker panel and position FLAP POWER SELECT switch on NORMAL #1.

(18) Actuate flap control lever to 0° detent to retract leading edge slats still connected to main drive gearbox.

(19) Remove accesses at inboard ends of slats No. 3 and 4 and adjust slat retraction (refer to 27-9-0, paragraph 2.E.).

NOTE: If flap and slat system was not operated while torque tubes were disconnected, readjustment should not be necessary.

(20) Lower slat No. 1 and 2 leading edge sections and connect torque tubes to connect all slats to slat main drive gearbox.

(21) Move flap control lever to 10° detent and allow slats to extend. Move flap control lever to 0° detent and allow slats to retract. Check fits and clearances of slats per 27-9-0, steps 2.A.(3), through 2.A.(5).

(22) Connect leading edge wiring and air ducts and complete installation of leading edge (refer to Chapter 57, WINGS).

(23) Check leading edge flap and slat control system operation (refer to 27-9-0, Adjustment/Test Leading Edge Flap and Slat Control System Functional Test).

NOTE: If a slat No. 1 or No. 2 actuator only has been replaced and no other rigging or adjustment has been changed, check leading edge flap and slat control system operation per 27-9-0, paragraphs 3.D. and 3.E.

(24) Check bleed air ducts for leaks (refer to Chapter 36, PNEUMATICS).

(25) Install all access panels and fairings and return airplane to normal configuration.

LEADING EDGE SLAT NO. 3 and 4 ACTUATORS - MAINTENANCE PRACTICES

1. Removal/Installation Leading Edge Slat No. 3 and 4 Actuators (see Figure 201)

A. Equipment Required.

(1) Stand suitable for reaching wing leading edge.

(2) Hydraulic power unit capable of delivering eight gallons per minute at 3000 PSIG.

(3) Source of external electrical power.

(4) Stand suitable for supporting wing leading edge and slat in flight attitude.

(5) Splined male adapter to adapt torque wrench to end of slat drive torque tube.

(6) Torque wrench.

(7) Spring scale.

B. Remove Slat No. 3 or 4 Actuator.

NOTE: If an actuator is to be removed from slat No. 3 or 4, the slat and associated leading edge section must first be removed from the airplane.

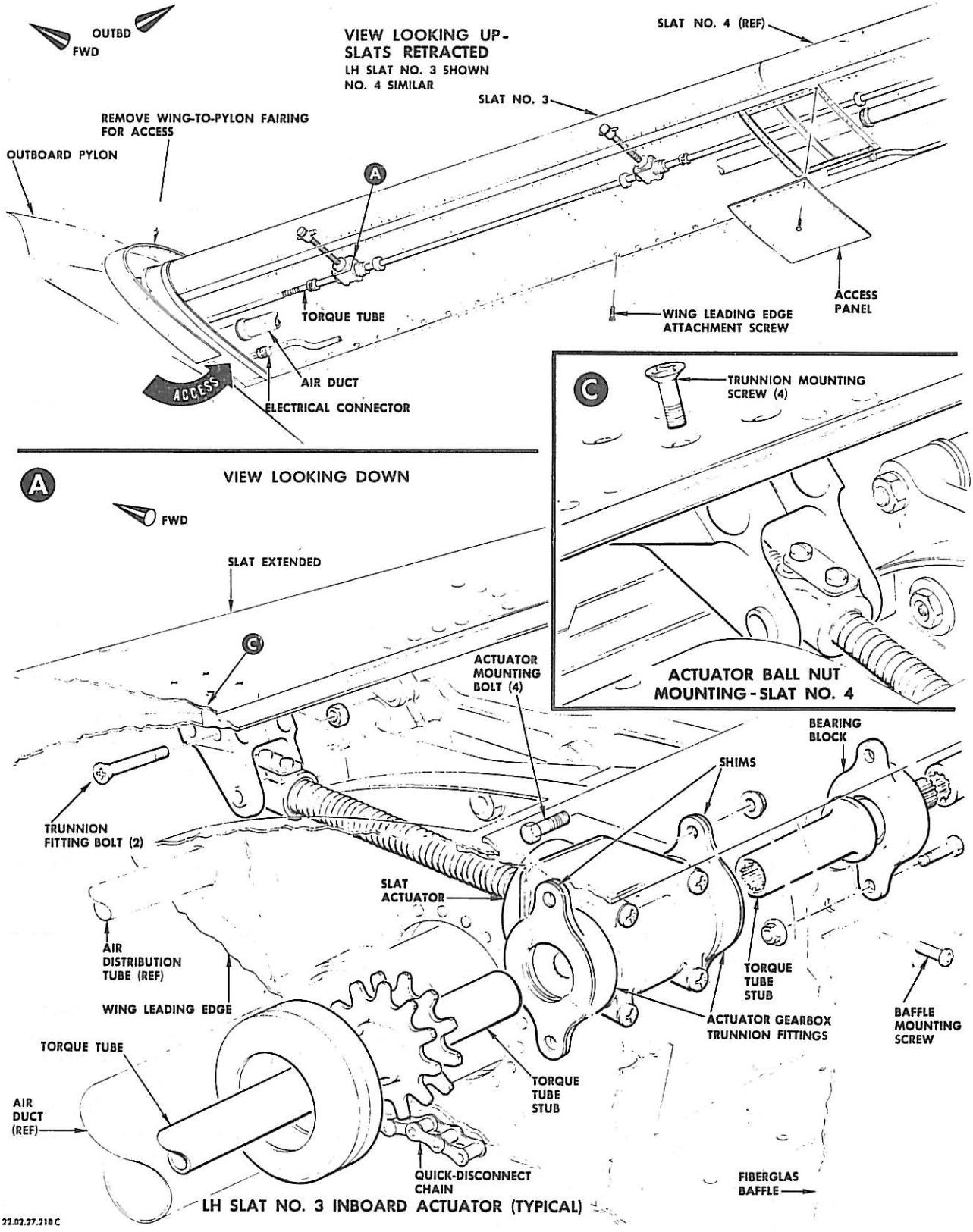
(1) Remove access panels from bottom of both ends of affected section of leading edge. Disconnect torque tube (refer to Removal/Installation Leading Edge Flap and Slat Drive Torque Tubes). Disconnect wiring and air duct and remove leading edge section (refer to Chapter 57, WINGS).

CAUTION: USE CARE TO AVOID DAMAGE TO SEAL INSTALLED ON INBOARD END OF SLAT NO. 4.

(2) Mount leading edge in flight attitude on suitable fixture. Remove fiberglas baffles from rear of leading edge.

(3) Extend slat using male adapter and splined coupling with a speed wrench or hand drill, until ball nuts contact ends of jack screws. Do not use a drill motor to extend slat against jack screw ends. Jack screw ends are not stops and may be dislodged by the power developed in a drill motor. If slat can not be extended, disconnect defective actuator from slat or leading edge and then extend slat. Disconnect torque tube between actuators if necessary.

(4) Disconnect torque tube between actuators by forcing universal joint or coupling, as applicable, back against spring on torque tube splines.


OUTBD
FWD
VIEW LOOKING UP-
SLATS RETRACTED
LH SLAT NO. 3 SHOWN
NO. 4 SIMILAR
SLAT NO. 4 (REF)
SLAT NO. 3
REMOVE WING-TO-PYLON FAIRING FOR ACCESS
OUTBOARD PYLON
A
TORQUE TUBE
ACCESS
AIR DUCT
ELECTRICAL CONNECTOR
WING LEADING EDGE ATTACHMENT SCREW
ACCESS PANEL
C
TRUNNION MOUNTING SCREW (4)
ACTUATOR BALL NUT MOUNTING - SLAT NO. 4
A
VIEW LOOKING DOWN
FWD
SLAT EXTENDED
C
ACTUATOR MOUNTING BOLT (4)
BEARING BLOCK
SHIMS
TRUNNION FITTING BOLT (2)
SLAT ACTUATOR
AIR DISTRIBUTION TUBE (REF)
WING LEADING EDGE
TORQUE TUBE STUB
ACTUATOR GEARBOX TRUNNION FITTINGS
BAFFLE MOUNTING SCREW
TORQUE TUBE
AIR DUCT (REF)
TORQUE TUBE STUB
QUICK-DISCONNECT CHAIN
FIBERGLAS BAFFLE
LH SLAT NO. 3 INBOARD ACTUATOR (TYPICAL)
22.02.27.218C

(5) Remove splined torque tube section from each side of actuator to be removed.

(6) Separate slat and ball nut trunnion fittings by removing four screws through top of slat. Remove two bolts through trunnion fitting halves. (Install trunnion fitting halves loosely on slat for use at installation.) Note position of filler shim between slat and trunnion fittings.

(7) Remove two bolts from each trunnion fitting at actuator gearbox. Remove actuator through rear of leading edge.

(8) Remove trunnion fittings from actuator gearbox and identify for use at installation.

C. Install Slat No. 3 or 4 Actuator.

(1) Assemble slat actuator and actuator trunnion fittings. Install actuator and fittings through rear of leading edge. Make sure that top of actuator, stamped "This side up", is facing top of leading edge.

(2) Install actuator gearbox trunnion fitting bolts. Attach spring scale to forward end of actuator jack screw and move actuator through full arc of movement. Force required to move actuator shall not exceed two pounds.

(3) If force required is greater than two pounds, install shims between actuator gearbox trunnion fittings and ribs to provide proper alignment of fittings. Shims may be thinned or tapered as necessary.

(4) Run actuator ball nut out to end of jack screw. Install trunnion fitting halves on ball nut trunnions and install two bolts through trunnion fitting halves. Install filler shim between slat and trunnion fittings and install four screws to attach slat to trunnion fittings. Make sure that ball return tubes are on upper side of ball nut.

(5) Install splined torque tube section in gearbox.

(6) Make sure that both slat actuator ball nuts are against ends of jack screws so that when slat is retracted, edges of slat will mate properly with leading edge. Connect torque tube between actuators.

(7) Retract slats No. 3 and 4 to approximately 80 percent of retract travel using splined adapter and splined coupling.

(8) Tap actuator to allow it to position correctly between trunnion fittings at gearbox. Measure and record distance between trunnion shoulders and trunnion fitting bushings.

(9) Fully extend slats and repeat step (7).

(10) Distances measured in steps (7) and (8) should be the same within ±0.15 inch.

(11) If distances are not in tolerance, check actuator ball nut trunnion fittings for alignment with actuator. Bushings in fittings must not bind on ball nut trunnions. Check actuator for parallel installation with slat tracks. Prepare laminated shims and install between gearbox trunnion fittings and rib as necessary to align actuator and decrease distance between gearbox trunnion shoulder and trunnion fittings to 0.03 (+0.001, -0.01) inch.

(12) Retract slat using splined coupling, male adapter, and speed wrench, or hand drill. Check fits and clearances at slat upper and lower mating edges (refer to Removal/Installation Leading Edge Slats No. 3 and 4).

(13) Install fiberglas baffles in rear of leading edge.

(14) Install leading edge on wing (refer to Chapter 57, WINGS). Do not connect torque tubes.

(15) Using male adapter and torque wrench, adjust slat retraction (refer to 27-9-0, paragraph 2.E.).

(16) Connect external source of electrical power (refer to Chapter 24, ELECTRICAL POWER).

(17) Connect external source of hydraulic power to airplane and pressurize No. 1 and 2 hydraulic systems (refer to Chapter 29, HYDRAULIC POWER).

CAUTION: DO NOT OPERATE FLAPS WHEN BOTH HYDRAULIC SYSTEMS ARE PRESSURIZED UNLESS ELECTRICAL POWER IS APPLIED TO THE AIRPLANE AND THE "FLAP ASYM CONT" CIRCUIT BREAKER IS CLOSED.

(18) Close FLAP ASYM CONT circuit breaker on main circuit breaker panel and position FLAP POWER SELECT switch on NORMAL #1.

(19) Actuate flap control lever to 0° detent to retract remainder of leading edge flap and slat system.

(20) Connect torque tubes at inboard ends of slats No. 3 and 4.

(21) Move flap control lever to 10° detent and allow slats to extend. Move flap control lever to 0° detent and allow slats to retract. Check fits and clearances of slats per 27-9-0, steps 2.A.(3) through 2.A.(5).

(22) Check leading edge flap and slat control system operation (refer to 27-9-0, Adjustment/Test Leading Edge Flap and Slat Control System Functional Test).

NOTE: If a slat No. 3 or No. 4 actuator only has been replaced and no other rigging or adjustment has been changed, check leading edge flap and slat control system operation per 27-9-0, paragraphs 3.D. and 3.E.

(23) Install all access panels and fairings and return airplane to normal configuration.

CONVAIR MODEL 30

MAINTENANCE MANUAL

TEMPORARY REVISION NO. 27-58.

Insert facing 27-10-0, Page 1, dated Feb. 15/63 (or subsequent).

The instructions on the noted facing page are to be used for all applicable airplanes except as follows: for airplanes CV30 through CV34 not modified per either Service Bulletin No. 31-1 (AMENDMENT No.13) or Service Bulletin No. 27-45, substitute the following instructions where indicated.

Retain this temporary revision in your manual until all applicable airplanes have been modified per either of the noted service bulletins.

Page 1, delete the portion of the last sentence on page beginning .....
"when the trailing edge flaps ....."

CONVAIR MODEL 30

MAINTENANCE MANUAL

TEMPORARY REVISION NO. 27-58.

Insert facing 27-10-0, Page 1, dated Feb. 15/63 (or subsequent).

The instructions on the noted facing page are to be used for all applicable airplanes except as follows: for airplanes CV26 through CV34 not modified per either Service Bulletin No. 51-1 (AMMENDMENT No.13) or Service Bulletin No. 27-45, substitute the following instructions where indicated.

Retain this temporary revision in your manual until all applicable airplanes have been modified per either of the noted service bulletins.

Page 1, delete the portion of the last sentence on page beginning ..... "when the trailing edge flaps ....."

WING LEADING EDGE FLAP CONTROL SYSTEM - DESCRIPTION AND OPERATION

(Section 27-10 applicable only to *Group II airplanes.)

1. Description

Eight flaps are mounted on the leading edge of each wing. The flaps are hinged at their leading edges and are designed to swing down and forward. Three flaps are located between the fuselage and the inboard pylon , three flaps between the inboard and the outboard pylon, and two flaps outboard of the outboard pylon. The flaps on each wing are numbered from one through eight, starting at the fuselage.

Hydraulic system No. 2 powers the electrically-controlled, hydraulically-actuated leading edge flaps. The flaps have two positions - fully retracted and fully extended.

Hydraulic pressure to the flap actuators keeps the flaps fully extended or fully retracted. Position of the leading edge flaps is automatically controlled by the flap control lever on the pilots' pedestal. Hydraulic pressure is routed, through restrictors, to the flap actuators by two solenoid-actuated control valves. Leading edge flaps No. 2 through 8 are controlled by the outboard flap control valve; the inboard flaps (flap No. 1) are controlled by the inboard (aft) control valve. Separate control valves are provided so that the inboard flaps may be automatically retracted for approach and landing.

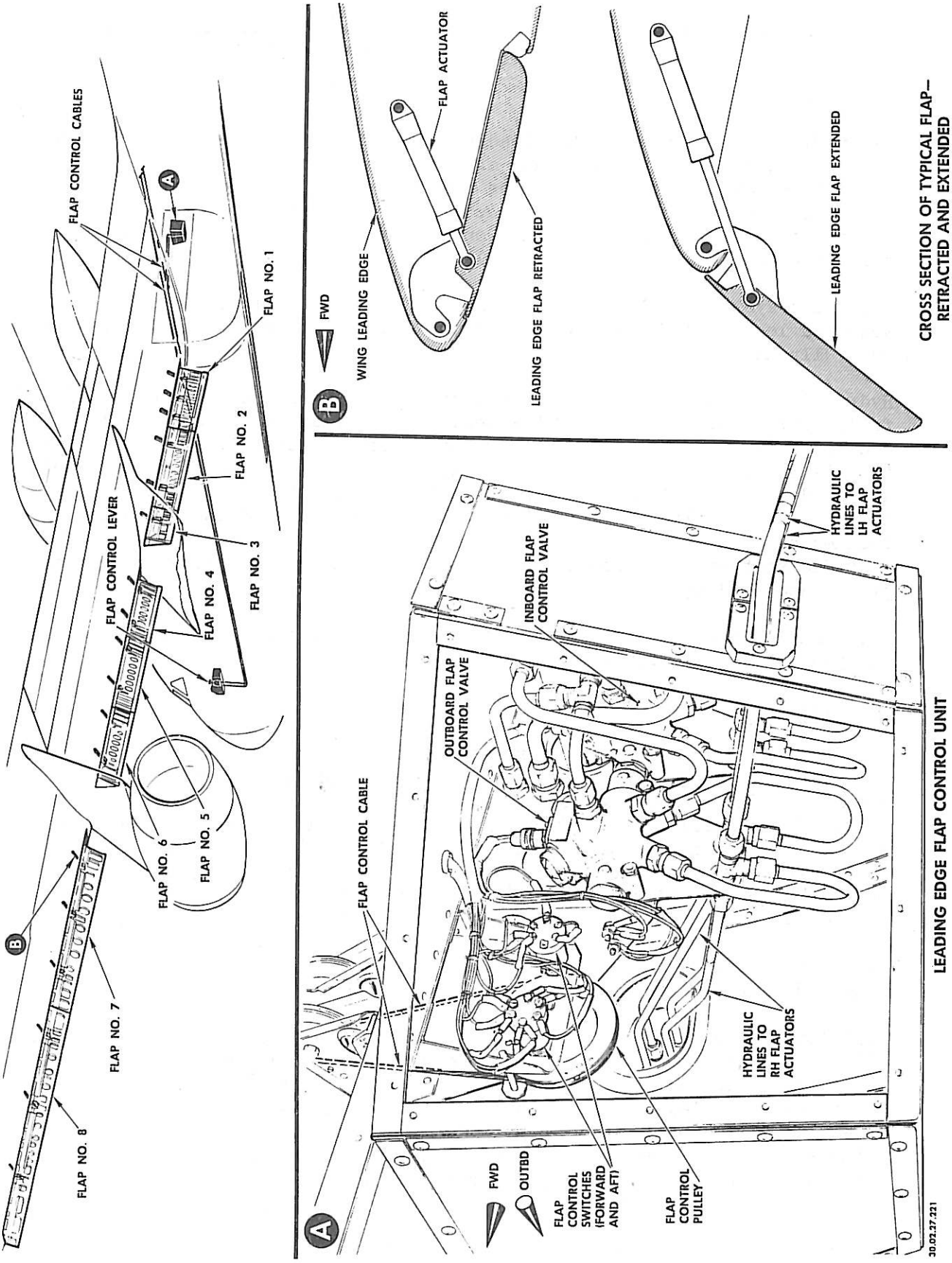
Two position and two warning lights on the pilot's instrument panel indicate the position of the flaps.

2. Operation

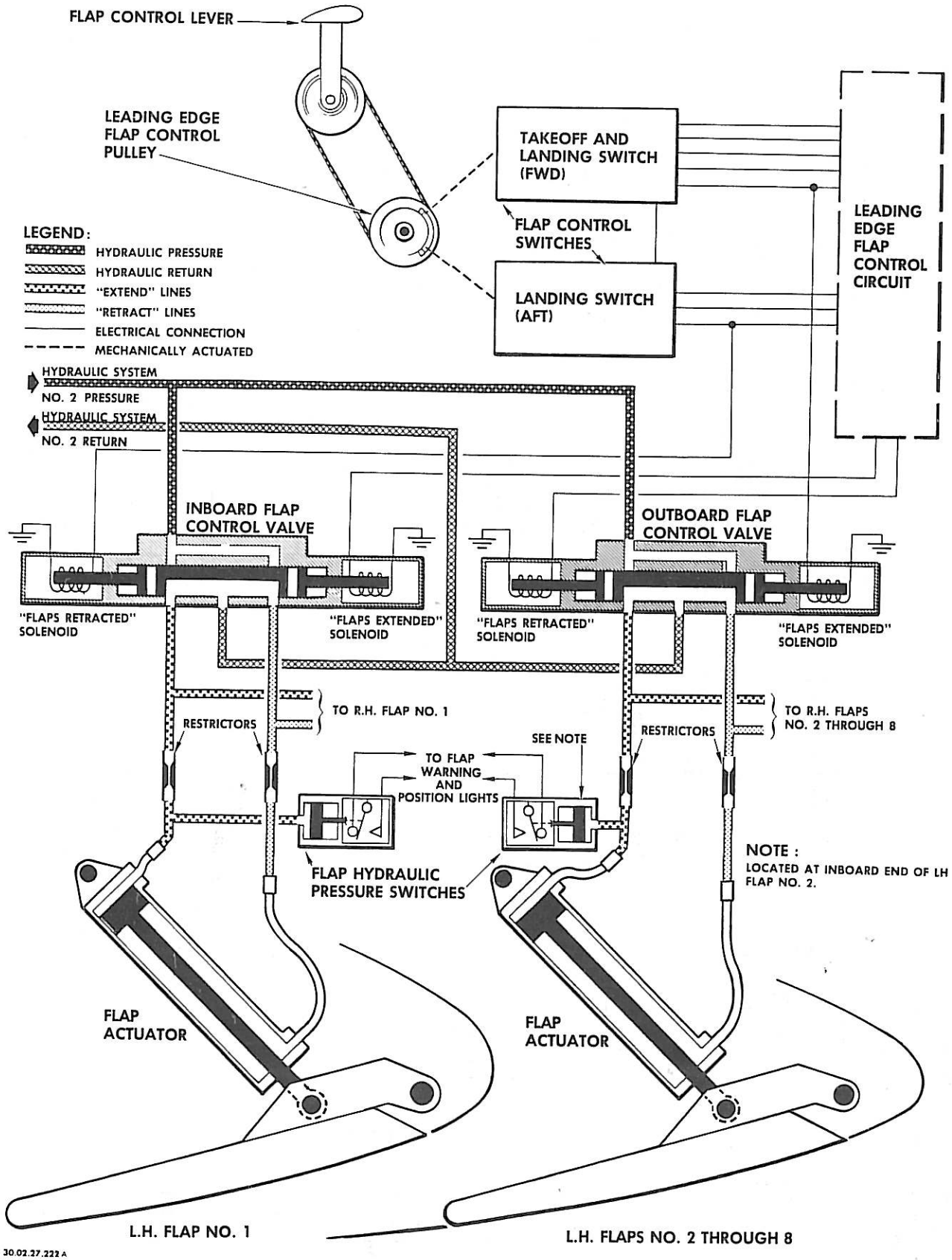
The leading edge flaps are controlled by the same control lever that controls the trailing edge flaps (see Figure 1). The flap control lever actuates a flap control pulley located in the leading edge flap control unit. The control unit is located in the right side of the fuselage at station 656 and is accessible through the zippered panel at the aft end of the forward baggage compartment. The flap control pulley actuates control switches which energize the retract and extend solenoids in the inboard and outboard flap control valves (see Figures 2 and 3). Hydraulic pressure from the No. 2 hydraulic system is directed by the control valves to the inboard flap actuators (flap No. 1 on each wing) and the outboard flap actuators (flaps No. 2 through 8 on each wing).

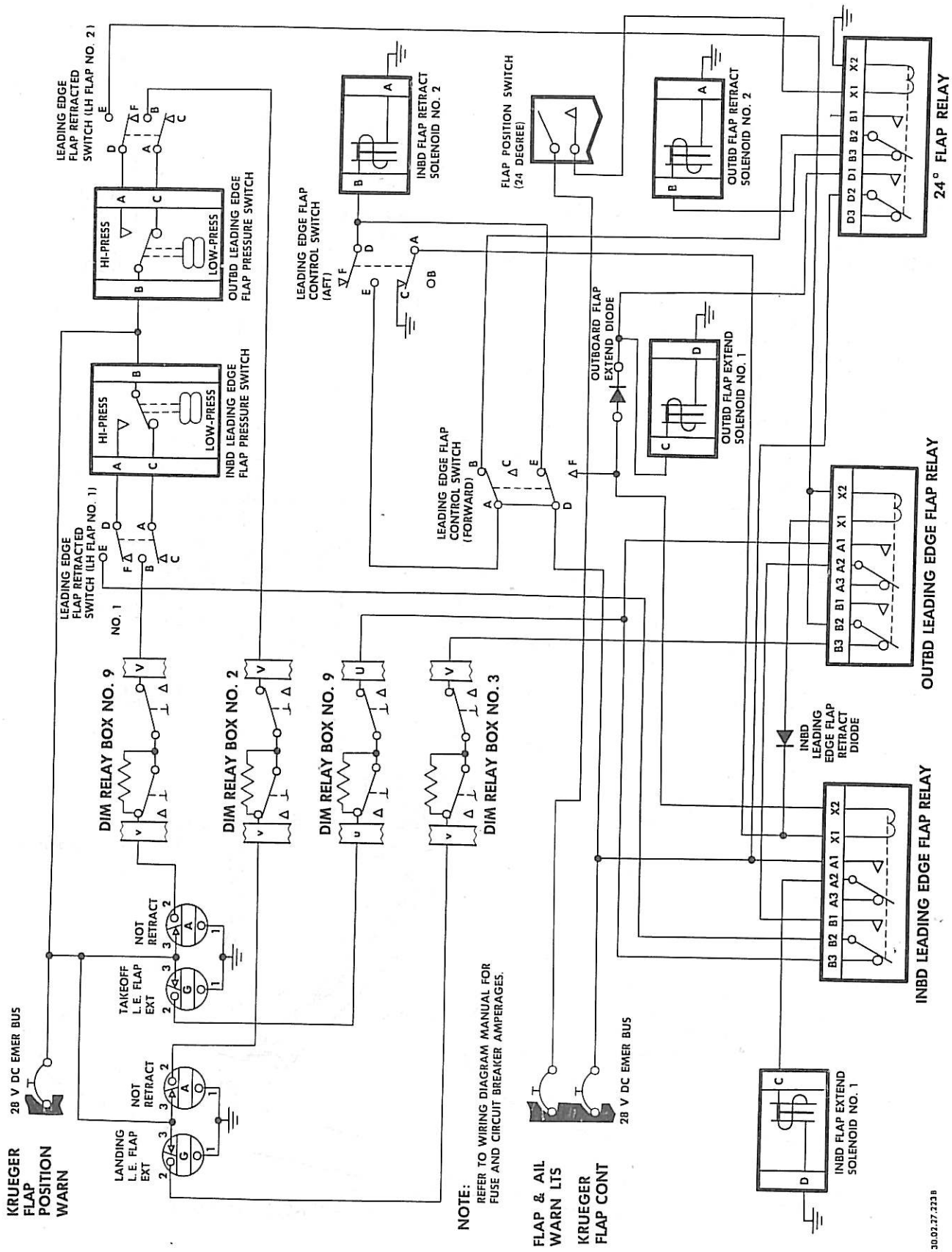
Positioning the flap control lever in either the 10° or 27° detent extends all the leading edge flaps. As the lever is moved just aft of the 27° detent the inboard flaps retract; flaps No. 2 through 8 on each wing remain extended. The flaps remain in this position when the control lever is moved to the 36° and 50° detents. When the flap control lever is again returned to the 0° detent, the remaining leading edge flaps begin to retract when the trailing edge flaps retract past the 24 degree position.

*For group designations refer to Manual INTRODUCTION.



Wing Leading Edge Flap Control System
Figure 1


FLAP CONTROL LEVER
LEADING EDGE FLAP CONTROL PULLEY
TAKEOFF AND LANDING SWITCH (FWD)
FLAP CONTROL SWITCHES
LANDING SWITCH (AFT)
LEADING EDGE FLAP CONTROL CIRCUIT
LEGEND:
HYDRAULIC PRESSURE
HYDRAULIC RETURN
"EXTEND" LINES
"RETRACT" LINES
ELECTRICAL CONNECTION
MECHANICALLY ACTUATED
HYDRAULIC SYSTEM NO. 2 PRESSURE
HYDRAULIC SYSTEM NO. 2 RETURN
INBOARD FLAP CONTROL VALVE
OUTBOARD FLAP CONTROL VALVE
"FLAPS RETRACTED" SOLENOID
"FLAPS EXTENDED" SOLENOID
"FLAPS RETRACTED" SOLENOID
"FLAPS EXTENDED" SOLENOID
TO R.H. FLAP NO. 1
TO R.H. FLAPS NO. 2 THROUGH 8
RESTRICTORS
RESTRICTORS
SEE NOTE
TO FLAP WARNING AND POSITION LIGHTS
FLAP HYDRAULIC PRESSURE SWITCHES
NOTE :
LOCATED AT INBOARD END OF LH FLAP NO. 2.
FLAP ACTUATOR
FLAP ACTUATOR
L.H. FLAP NO. 1
L.H. FLAPS NO. 2 THROUGH 8
30.02.27.222 A



Wing Leading Edge Electrical System Schematic
Figure 3

Flap warning and position lights on the pilot's instrument panel indicate when the flaps are traveling from extend to retract position, when all flaps are extended, and when inboard flaps are retracted and outboard flaps are extended. The inboard NOT RETRACT light illuminates when flap No. 1 on the left wing is in transit, and the outboard NOT RETRACT light illuminates when flap No. 2 on the left wing is in transit. The TAKEOFF L. E. FLAPS EXT light illuminates when all flaps are fully extended. The LANDING L. E. FLAPS EXT light illuminates when only flaps No. 2 through 8 in both wings are fully extended.

When the flaps reach the fully extended position and hydraulic pressure in the flap system reaches 2600 (±250) psi, the hydraulic pressure switches actuate to the high pressure position. This routes electrical power through the inboard and outboard flap retracted switches and flap relays to illuminate the TAKEOFF L. E. FLAP EXT light. As the inboard flaps are retracted for landing, the inboard NOT RETRACT light illuminates while the flaps are in transit and extinguishes when the inboard flap retracted switches are actuated by the fully retracted flaps. The TAKEOFF L. E. FLAP EXT light is then extinguished. The LANDING L. E. FLAP EXT light is illuminated by electrical power routed through the high pressure side of the outboard hydraulic pressure switch, through the deactuated L. H. flap No. 2 retracted switch, and then through the outboard flap relay to the light. If the control lever is moved to the 0° detent, the LANDING L. E. FLAPS EXT light extinguishes and the outboard NOT RETRACT light is illuminated until the flaps are completely retracted. All leading edge flap warning and position lights are extinguished when all the leading edge flaps are fully retracted.

3. Leading Edge Flaps

The wing leading edge flaps are supported by hinges attached to the wing leading edge structure. In the retracted position, the leading edge flaps complete the contour of the wing leading edge; when extended they deflect the air flow over the upper surface of the wing, permitting the airplane to fly at a higher angle of attack and lower air speed without stalling. For information regarding leading edge flap structure, refer to Chapter 57, WINGS.

Flaps No. 1 and 7 are supported by three main hinges; flap No. 8 is supported by three main and one secondary or idler hinge; flaps No. 4, 5, and 6 are supported by two main hinges; flap No. 2 is supported by two main and three secondary hinges; and flap No. 3 is supported by one main and two secondary hinges.

Flaps No. 1, 2 and 3 seal against the lower surface of the wing leading edge when the flaps are extended. Flaps No. 4, 5 and 6 incorporate a hinged air seal at the flap forward edge, while flaps No. 7 and 8 have fabric curtains installed between the flap and the wing leading edge.

4. Leading Edge Flap Actuators

Thirty-six hydraulic actuators are installed in the leading edge flap system. An actuator is installed at each main hinge location on each flap. Flaps No. 1, 7 and 8 each have three actuators; flaps No. 2, 4, 5 and 6 each have two actuators and flap No. 3 has one actuator.

Each flap actuator assembly consists of a cylinder with a hydraulic-actuated piston. Hydraulic pressure from system No. 2 is routed through flap control valves and restrictors to the flap actuators. Restrictors are installed in each actuator "up" and "down" line to provide uniform extend and retract rates.

5. Leading Edge Flap Control Unit

The leading edge flap control unit, mounted in the fuselage on the right side at station 656 and accessible through a zippered panel in the aft end of the forward cargo compartment, consists of two flap control switches, a flap control pulley, and two flap control valves. The trailing edge flap RH control cable is attached to the control pulley. As the flap control lever is positioned in the 10° or 27° detent, the control pulley actuates the forward control switch. Electrical power is routed to energize and position both flap control valve extend solenoids and direct hydraulic pressure to extend all the leading edge flaps. Placing the flap control lever in the 36° or 50° detent deactuates the aft control switch, removing electrical power from the inboard flap (flap No. 1) control valve extend solenoid and routing electrical power to the inboard flap control valve retract solenoid. The inboard flaps retract and the outboard flaps remain extended. Returning the flap control lever to the 0° detent deactuates the forward control switch and actuates the aft control switch. The retract solenoid of the inboard flap control valve remains energized, but electrical power to energize the outboard flap retract solenoid is delayed until the trailing edge flaps retract past the 24 degree position. As the trailing edge flaps pass the 24 degree position, a flap position switch at the trailing edge flap central drive gear box is actuated to interrupt current flow to the 24 degree flap relay solenoid position, causing power to be directed to the outboard flap retract solenoid and the outboard flaps to retract.

6. Leading Edge Flap Control Switches

The two double-pole, double-throw flap control switches are mounted in the flap control unit forward of the flap control valves. The retract and extend solenoids in both control valves are actuated by the forward flap control switch. Power is directed to the inboard flap control valve retract solenoid, and a ground for the flap relays is provided by the aft control switch. When the flap control lever is moved approximately 1.30 inches aft of the 8° detent, the forward control switch is actuated, the extend solenoids in the control valves are energized, and the flaps extend. The aft control switch remains deactuated until the flap control lever is moved

0.30 inch aft of the 27° detent. At this point, the aft control switch is actuated, the retract solenoid in the inboard control valve is energized and the inboard flaps retract. The remaining flaps will retract when the control lever is returned to the 0° detent and the trailing edge flaps retract past the 24 degree flap position.

7. Leading Edge Flap Control Valves

Two control valves are mounted in the flap control unit aft of the flap control switches. Each control valve incorporates electrically-controlled retract and extend solenoids. When the retract solenoid is energized, hydraulic pressure is routed through the valve to the actuators to retract the applicable flaps; the extend solenoid controls flap extension. The control valve is in the neutral condition when electrical power is removed from the retract and extend solenoids. The forward flap control valve controls the outboard flaps (No. 2 through 8) and the aft valve controls the inboard flaps (flap No. 1).

8. Leading Edge Flap Control Pulley

The leading edge flap control pulley, located in the flap control unit, is connected by the trailing edge flap RH control cable to the flap control lever on the pilots' pedestal. As the control lever is moved, a cam on the inboard side of the pulley is rotated to actuate or deactuate the flap control switches. The switches route electrical power to the flap control valves.

9. Leading Edge Flap Retracted Switches

Two double-pole, double-throw, flap actuated flap retracted switches are located in the wing leading edge at the inboard ends of LH flaps No. 1 and No. 2. The flap retracted switches are in separate circuits, with each circuit having its own hydraulic pressure switch and flap relay. When the flaps are retracted, the switches are actuated (compressed) and the contacts are open. As the flaps begin to extend, the switches are deactuated and the contacts are closed until the flaps are fully retracted.

One side of each flap retracted switch directs power from the low pressure contact on the applicable pressure switch to the inboard or outboard NOT RETRACT light. The other side of the flap retracted switch connects the high pressure contact in the pressure switches to the TAKEOFF L. E. FLAP EXT or LANDING L. E. FLAP EXT lights, through the flap control relays. Both flap retracted switches must be deactuated (extended) to allow the TAKEOFF L. E. FLAP EXT light to be illuminated, while a combination of LH flap No. 1 retracted switch actuated and LH flap No. 2 retracted switch deactuated is necessary before the LANDING L. E. FLAP EXT light can be illuminated.

10. Leading Edge Flap Hydraulic Pressure Switches

Two double-pole, double-throw hydraulic pressure switches are located in the LH wing leading edge. The pressure switch in the inboard flap system (flap No. 1 on each wing) is installed at the inboard end of LH flap No. 1. The pressure switch in the outboard flap system (flaps No. 2 through 8 on each wing) is installed at the inboard end of LH flap No. 2.

The pressure switches are installed in the flap "extend" pressure line. They are actuated to the high pressure position when the flaps are fully extended. During flap retraction, no pressure is routed through the pressure switches and they are in the low pressure position. When the flap hydraulic pressure switches are in the high pressure position, circuits are completed through the flap relays to the flap position lights. In the low pressure position, the pressure switches complete circuits through the deactuated (not compressed) flap retracted switches to the flap warning lights (NOT RETRACT).

The flap hydraulic pressure switches are actuated to the high pressure position at 2600 (±250) psi and to the low pressure position at not less than 2000 psi.

11. Leading Edge Flap Relays

Two flap relays are located on the station 310 control relay panel on the left side of the electrical and electronic compartment. Power is routed through the inboard flap relay, when the relay solenoid is energized, to the inboard flap extend solenoid and contacts in the outboard flap relay. When the inboard and outboard flap relay solenoids are energized, current is directed through both relays to the flap TAKEOFF L.E. FLAP EXT position light. When both relay solenoids are deenergized, current is routed through the outboard relay to the LANDING L.E. FLAP EXT position light.

Two leading edge flap relays and a trailing edge flap 24 degree position relay are mounted on the station 310 control relay panel on the left side of the electrical and electronic compartment. The two leading edge flap relays provide control for extending the inboard flaps and illuminating the flap position lights. The flap 24 degree position relay delays retraction of the outboard leading edge flaps until the trailing edge flaps retract past the 24 degree position.

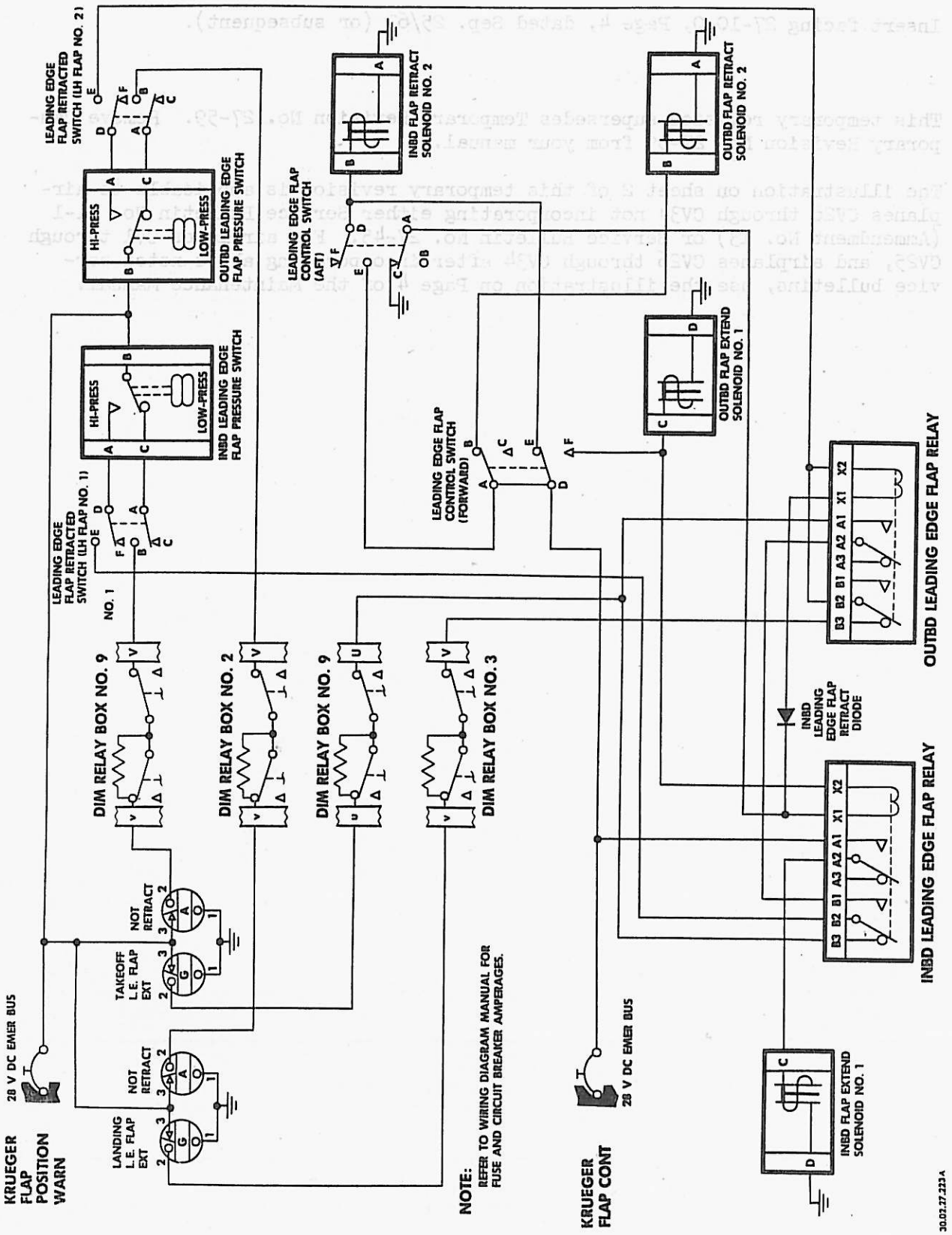
Power is routed through the inboard leading edge flap relay, when the relay solenoid is energized, to the inboard flap extend solenoid and contacts in the outboard flap relay. When the inboard and outboard flap relay solenoids are energized, current is directed through both relays to the flap TAKEOFF L.E. FLAP EXT position light. When both relay solenoids are deenergized, current is routed through the outboard relay to the LANDING L.E. FLAP EXT position light. The flap 24 degree position relay is controlled by a flap position switch mounted in the switch assembly on the trailing edge flap central drive gear box. The flap position switch is actuated at the trailing edge flap 24 degree position.

TEMPORARY REVISION NO. 27-100

Insert facing 27-10-0, Page 4, dated Sep. 25/63 (or subsequent).

This temporary revision supersedes Temporary Revision No. 27-59. Remove Temporary Revision No. 27-59 from your manual.

The illustration on sheet 2 of this temporary revision is applicable to airplanes CV26 through CV34 not incorporating either Service Bulletin No. 51-1 (Ammendment No. 13) or Service Bulletin No. 27-45. For airplanes CV1 through CV25, and airplanes CV26 through CV34 after incorporating above noted service bulletins, use the illustration on Page 4 of the Maintenance Manual.



Wing Leading Edge
Flap Electrical System Schematic
Figure 3

CONVAIR MODEL 30

MAINTENANCE MANUAL

TEMPORARY REVISION NO. 27-60.

Insert facing 27-10-0, Page 6, dated Feb. 15/63 (or subsequent).

The instructions on the noted facing page are to be used for all applicable airplanes except as follows: for airplanes CV26 through CV34 not modified per either Service Bulletin No. 51-1 (Ammendment No. 13) or Service Bulletin No. 27-45, substitute the following instructions where indicated.

Retain this temporary revision in your manual until all applicable airplanes have been modified per noted service bulletin.

Page 6, delete last two sentences of paragraph 5, and substitute the following:

> This causes electrical power to energize the retract solenoid of each flap control valve and the remaining leading edge flaps retract.

Page 6. delete the last sentence of paragraph 6, and substitute the following:

> The remaining flaps will retract when the control lever is returned to the 0° detent.

CONVAIR MODEL 30

MAINTENANCE MANUAL

TEMPORARY REVISION NO. 27-61.

Insert facing 27-10-0, Page 8, dated Feb. 15/63 (or subsequent).

The instructions on the noted facing page are to be used for all applicable airplanes except as follows: for airplanes CV26 through CV34 not modified per either Service Bulletin No. 51-1 (Ammendment No. 13) or Service Bulletin No. 27-45, substitute the following instructions where indicated.

Retain this temporary revision in your manual until all applicable airplanes have been modified per either of the noted service bulletins.

Page 8, delete paragraph 11 and substitute the following:

11. Leading Edge Flap Relays

Two leading edge flap relays are located on the station 310 control relay panel on the left side of the electrical and electronic compartment. Power is routed through the inboard flap relay, when the relay solenoid is energized; to the inboard flap extend solenoid and contacts in the outboard flap relay. When the inboard and outboard flap relay solenoids are energized, current is directed through both relays to the flap TAKEOFF L. E. FLAP EXT position light. When both relay solenoids are de-energized, current is routed through the outboard relay to the LANDING L. E. FLAP EXT position light.

12. Leading Edge Flap Position and Warning Lights

Two amber flap warning lights (NOT RETRACT) and two green flap position lights (TAKEOFF L.E. FLAP EXT and LANDING L.E. FLAP EXT) are located in the lower right corner of the pilot's instrument panel. The lights are the press-to-test type with transparent lenses in the caps. The base of each light is mechanically indexed to prevent accidental interchange.

Illumination of the flap position and warning lights on the pilot's instrument panel is controlled by the inboard and outboard flap hydraulic pressure switches, flap retracted switches, and flap relays. When the flaps are extending, no lights are illuminated.

WING LEADING EDGE FLAP CONTROL SYSTEM - TROUBLE SHOOTING

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION

NOTE: Apply electrical and hydraulic power to airplane prior to using the following trouble shooting procedures (refer to Chapter 24, ELECTRICAL POWER and Chapter 29, HYDRAULIC POWER).

The wing leading edge flaps may be operated separately from the trailing edge flaps. To do this, position the FLAP POWER SELECT switch on NORMAL #1, check that FLAP ASYM CONT and KRUEGER FLAP - CONT circuit breakers on main circuit breaker panel are closed, pressurize hydraulic system No. 2 only, and actuate the flap control lever to the desired position. To operate the wing trailing edge flaps in conjunction with the leading edge flaps refer to 27-4-0, Section 2, Paragraph D.

1.	ALL WING LEADING EDGE FLAPS INOPERATIVE	
	A. Faulty circuit breaker.	Check for voltage through KRUEGER FLAP - CONT circuit breaker on main circuit breaker panel. If no voltage, replace circuit breaker or correct circuit as necessary. If voltage is present, trouble is elsewhere.
	B. No hydraulic pressure at leading edge flap control valves.	Check that hydraulic system No. 2 is pressurized (refer to Chapter 29, HYDRAULIC POWER).
2.	INBOARD FLAPS (FLAP NO. 1) WILL NOT EXTEND; ALL OUTBOARD FLAPS EXTEND	
	A. Inboard flap relay defective.	With flap control lever in 10° detent, check voltage at inboard flap relay. If no voltage, correct circuit as necessary. If voltage to flap control relay, check for audible click of relay when flap control lever is moved to 10° detent. If no audible click, check for ground through flap aft control switch. If no ground, replace switch or correct circuit as necessary. If ground is satisfactory check for current through flap forward control switch. If no current, replace switch or correct circuit. If switch is satisfactory replace inboard flap relay.

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION
2. INBOARD FLAPS (FLAP NO. 1) WILL NOT EXTEND; ALL OUTBOARD FLAPS EXTEND (CONT)	
B. Inboard flap control valve defective.	If inboard flap relay checks satisfactory, check voltage through contact points in inboard flap relay to inboard flap control valve. If no voltage at control valve, replace relay or correct circuit as necessary. If voltage to control valve, check voltage through control valve. If no voltage through control valve, replace control valve.
3. OUTBOARD FLAPS (FLAPS NO. 2 THROUGH 8) ON EACH WING WILL NOT EXTEND: INBOARD FLAPS EXTEND	
A. Outboard flap control valve defective.	With flap control lever in 10° detent, check voltage through outboard flap control valve. If no voltage through control valve, replace control valve or correct circuit as necessary.
4. INBOARD FLAPS (FLAP NO. 1) WILL NOT RETRACT WITH FLAP CONTROL LEVER IN 36° DETENT	
A. Flap aft control switch defective.	Check voltage through flap aft control switch. If no voltage, replace switch or correct circuit as necessary.
B. Flap inboard control valve defective.	If flap aft control switch check is satisfactory, check for voltage through inboard flap control valve. If no voltage, replace control valve or correct circuit as necessary.
5. INBOARD FLAPS (FLAP NO. 1) WILL NOT RETRACT WITH FLAP CONTROL LEVER IN 0° DETENT; OUTBOARD FLAPS RETRACT	
A. Flap aft control switch defective.	Check voltage through flap aft control switch. If no voltage, replace switch or correct circuit as necessary.
B. Inboard flap control valve defective.	If control switch is satisfactory, check voltage through inboard flap control valve. If no voltage, replace valve or correct circuit as necessary.

CONVAIR MODEL 30

MAINTENANCE MANUAL

TEMPORARY REVISION NO. 27-62.

Insert facing 27-10-0, Page 103, dated Feb. 15/63 (or subsequent).

The instructions on the noted facing page are to be used for all applicable airplanes except as follows: for airplanes CV26 through CV34 not modified per either Service Bulletin No. 51-1 (Ammendment No. 13) or Service Bulletin No. 27-45, substitute the following instructions where indicated.

Retain this temporary revision in your manual until all applicable airplanes have been modified per either of the noted service bulletins.

Page 103, delete POSSIBLE CAUSE 6.B., 6.C., and 6.D.

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION
6. OUTBOARD FLAPS (FLAPS NO. 2 THROUGH 8) WILL NOT RETRACT WITH FLAP CONTROL LEVER IN 0° DETENT; INBOARD FLAPS RETRACT	
A. Refer to 5.A. and B. Substitute forward for aft in 5.A., and outboard for inboard in 5.B.	
B. Trailing edge flaps not retracted past 24 degree position.	Refer to 12-4-0, Flap Control System - Trouble Shooting.
C. No. 2 flap position switch defective.	Check continuity through switch with flaps in full-up position. If no continuity, replace switch.
D. Defective 24 degree flap relay on control relay panel at fuselage station 310.	Check voltage through pins B3 and B2 on relay with trailing edge flaps in full-up position (relay solenoid de-energized). If no continuity, replace relay.
7. FLAP INBOARD "NOT RETRACT" WARNING LIGHT NOT ILLUMINATED WHILE INBOARD FLAPS (FLAP NO. 1) ARE RETRACTING	
A. Faulty bulb.	Push light cap to test bulb. If bulb does not illuminate, replace bulb.
B. Faulty circuit breaker.	Check voltage through KRUEGER FLAP - POSITION WARN circuit breaker. If no voltage through circuit breaker, replace circuit breaker or repair circuit as necessary.
C. Inboard flap hydraulic pressure switch defective.	If circuit breaker check is satisfactory, check voltage through inboard flap hydraulic pressure switch in the low pressure condition (flaps retracting). If no voltage through switch, replace switch or correct circuit as necessary.
D. LH flap No. 1 retracted switch defective.	If pressure switch check is satisfactory, check voltage through LH flap No. 1 retracted switch in the deactuated (not compressed) position. If no voltage through switch, replace switch or correct circuit as necessary.
E. Open circuit between flap retract switch and inboard flap NOT RETRACT light.	Check voltage at inboard flap NOT RETRACTED. If no voltage to light, correct circuit as necessary.

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION

8. FLAP OUTBOARD "NOT RETRACT" LIGHT NOT ILLUMINATED WHILE OUTBOARD FLAPS (FLAPS NO. 2 THROUGH 8) ARE RETRACTING

A. For POSSIBLE CAUSE and ISOLATION PROCEDURE AND CORRECTION refer to trouble No. 7. Substitute outboard for inboard in 7.C. and E., and substitute flap No. 2 for flap No. 1 in 7.D.

9. "TAKEOFF L. E. FLAP EXT" POSITION LIGHT NOT ILLUMINATED WITH ALL FLAPS COMPLETELY EXTENDED

A.	Faulty bulb.	Press light cap to test bulb. If bulb does not illuminate, replace bulb.
B.	Faulty circuit breaker.	Check voltage through KRUEGER FLAP - POSITION WARN circuit breaker. If no voltage through circuit breaker, replace circuit breaker or correct circuit as necessary.
C.	Inboard or outboard flap hydraulic pressure switch defective.	Check voltage through flap hydraulic pressure switches in high pressure position. If no voltage through switch(es), replace switch(es) or correct circuit as necessary.
D.	Flap retracted switch defective.	If hydraulic pressure switch check is satisfactory, check voltage through flap retracted switches in deactuated position. If no voltage, replace switch(es) or correct circuit as necessary.
E.	Flap relay defective.	If flap retracted switch check is satisfactory, check voltage through contact points on inboard flap relay. If no voltage through relay, check current and ground to relay solenoid. If solenoid is energized, replace relay or correct circuit as necessary. Check current through contact points on outboard flap relay. If no voltage through points, check current and ground to relay solenoid. If solenoid is energized, replace relay or correct circuit as necessary.
F.	Open circuit between flap relays and light.	Check voltage at TAKEOFF L. E. FLAP EXT light. If no voltage at light, correct circuit as necessary.

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION
10. "LANDING L.E. FLAP EXT" POSITION LIGHT NOT ILLUMINATED WITH INBOARD FLAPS (FLAP NO. 1) RETRACTED AND OUTBOARD FLAPS COMPLETELY EXTENDED	
A. Faulty bulb.	Press light cap to test bulb. If bulb does not illuminate, replace bulb.
B. Faulty circuit breaker.	Refer to 9.B.
C. Outboard flap hydraulic pressure switch defective.	Check voltage through outboard flap hydraulic pressure switch in high pressure position. If no voltage through switch, replace switch or correct circuit as necessary.
D. LH flap No. 2 retracted switch defective.	If pressure switch check is satisfactory, check voltage through outboard flap retracted switch. If no voltage, replace switch or correct circuit as necessary.
E. Outboard flap relay defective.	If flap retracted switch check is satisfactory, check voltage through contact points on outboard flap relay. If no voltage through relay, replace relay or correct circuit as necessary.
F. Open circuit between outboard flap relay and light.	Check voltage at LANDING L. E. FLAP EXT light. If no voltage to light, correct circuit as necessary.

WING LEADING EDGE FLAPS - MAINTENANCE PRACTICES

1. Adjustment/Test Wing Leading Edge Flap Control System Rigging Procedure (see Figure 201)

A. Equipment Required.

(1) Protractors - (TSTO 30J76 or equivalent) zero to 130 degrees range, calibrated in 0.5-degree increments.

(2) Index pin - (3/16-inch diameter) for rigging leading edge flap control pulley.

(3) Twelve-inch straight edge.

B. Adjust Flap Control Cable.

(1) Depressurize airplane's No. 1 and No. 2 hydraulic systems (refer to Chapter 12, SERVICING).

(2) Check that leading edge flap control cables are properly installed.

(3) Actuate flap control lever on pilots' pedestal to 0° detent.

(4) Attempt to insert index pin in leading edge flap control pulley at aft end of forward baggage compartment.

(5) If index pin cannot be inserted with flap control lever in 0° detent, rerig flap cables in fuselage (refer to 27-4-0, Adjustment/Test Flap Control System Rigging Procedure).

(6) Remove index pin from leading edge flap control pulley and move flap control lever to 50° detent.

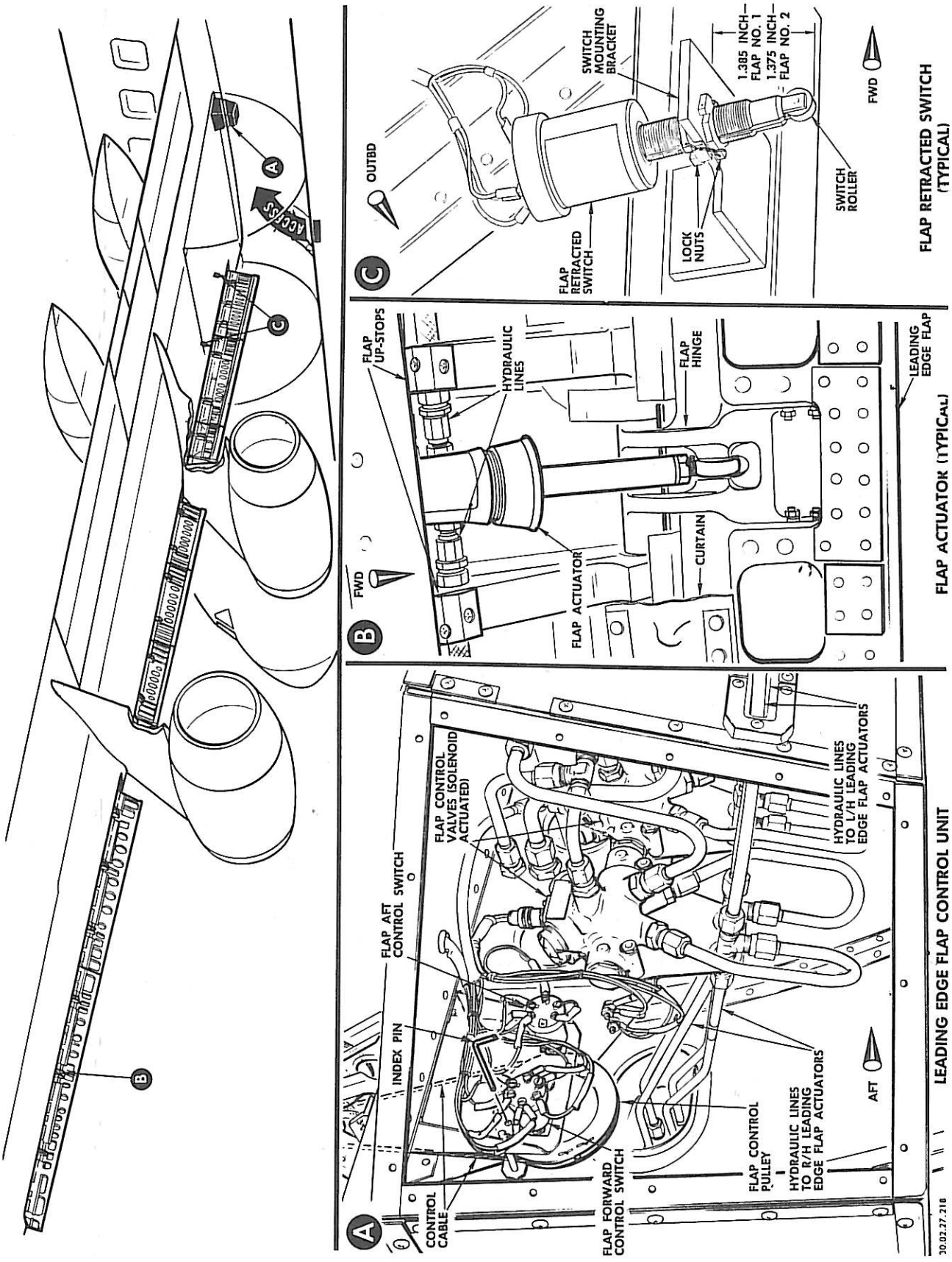
NOTE: Leading edge flap control pulley should rotate approximately 121 degrees when wing trailing edge flap aft cable quadrant contacts its "down flap" stop.

C. Adjust Flap Control Switches.

(1) Adjust forward control switch to actuate when flap control lever is 1.30 (±0.20) inches aft of 0° detent. Measure distance at top surface of pedestal cover.

(2) Adjust aft control switch to deactuate when flap control lever is 0.30 (+0.20, -0.10) inch aft of 27° detent. Measure distance at top surface of pedestal cover.

(3) Move flap control lever through full range of travel. Flap control switches should be as indicated in Table I.



Wing Leading Edge Flap Control
System Rigging and Adjustment
Figure 201

TABLE I

FLAP CONTROL SWITCH CONFIGURATION VS FLAP CONTROL LEVER POSITION

Flap Control Lever Position	Flap Forward Control Switch	Flap Aft Control Switch
0°	Deactuated	Actuated
10°	Actuated	Actuated
27°	Actuated	Actuated
36°	Actuated	Deactuated
50°	Actuated	Deactuated

D. Adjust Flap Actuators.

(1) Install protractors (TSTO 30J76) on leading edge flaps in the following locations:

(a) Flap No. 2 - Inboard and outboard end.

(b) Flap No. 5 - Inboard and outboard end.

(c) Flap No. 7 - Inboard end.

(d) Flap No. 8 - Outboard end.

CAUTION: DETERMINE THAT FLAP RETRACTED SWITCH PLUNGERS (LH FLAPS NO. 1 AND 2) DO NOT BOTTOM OUT WHEN FLAPS ARE FULLY RETRACTED.

(2) With flaps retracted against surface stops and stops adjusted so that flaps are in contour with wing leading edge (+0.060, -0.000 inch), adjust protractors to zero degree position.

(3) Adjust flap actuators located adjacent to protractors to extend flaps as follows:

(a) Flap No. 2 - 98 (±2) degrees.

(b) Flap No. 5 - 114.5 (±2) degrees.

(c) Flaps No. 7 and 8 - 115 (±2) degrees.

CAUTION: TO PREVENT A TORSIONAL LOAD ON THE FLAPS ATTACH ONLY ONE ACTUATOR TO THE FLAP AND ADJUST IT SO THE FLAP IS IN ITS PROPER EXTENDED POSITION WHEN THE ACTUATOR IS FULLY EXTENDED; THEN, ADJUST REMAINING ACTUATOR(S) TO CORRECT LENGTH AND INSTALL. (REFER TO 27-10-1, PAGES 201 AND 203 FOR ACTUATOR ATTACHING BOLT TORQUE VALUES.)

(4) Adjust remaining flap actuators to align flap surfaces. Flaps must align within ±0.25 inch with adjacent flap. Use a straight edge and sight along leading edges of extended flaps.

(a) Align flaps No. 1, 2, and 3.

(b) Align flaps No. 4, 5, and 6.

(c) Align flaps No. 7 and 8.

E. Adjust Flap Seals.

(1) With flaps extended, adjust seals to close gaps between flaps in the following groups:

(a) Flaps No. 1, 2, and 3.

(b) Flaps No. 4, 5 and 6.

(c) Flaps No. 7 and 8.

F. Adjust Flap Retracted Stops.

(1) Adjust flap retracted stops as follows, so that flaps are in contour with wing leading edge (+0.060, -0.000 inch):

(a) Flaps No. 1, 2 and 3 - Screw adjustable stop in or out. Stops are located on wing leading edge at each flap actuator.

(b) Flaps No. 4, 5 and 6 - Remove laminations from filler or add shims as necessary to stops on leading edge flap at each flap actuator.

(c) Flaps No. 7 and 8 - Add or remove shims under stops on wing leading edge at each flap actuator.

G. Adjust Flap Retracted Switches.

(1) Adjust flap retracted switch so that distance from surface of switch mounting bracket to tip of switch plunger roller is approximately 1.3 inches.

(2) Spread ends of cotter pin and slip over switch plunger at switch sleeve.

(3) Slowly raise flaps to retracted position and then lower flaps.

(4) Compress switch plunger by hand to new location of cotter pin and determine that switch actuates but does not bottom out.

NOTE: Audible click indicates point of switch actuation. Point of switch actuation should be just before flap reaches stops.

CONVAIR MODEL 30

MAINTENANCE MANUAL

TEMPORARY REVISION NO. 27-63.

Insert facing 27-10-0, Page 205, dated Feb. 15/63 (or subsequent).

The instructions on the noted facing page are to be used for all applicable airplanes except as follows: for airplanes CV26 through CV34 not modified per either Service Bulletin No. 51-1 (Ammendment No. 13) or Service Bulletin No. 27-45, substitute the following instructions where indicated.

Retain this temporary revision in your manual until all applicable airplanes have been modified per either of the noted service bulletins.

Page 205, delete steps 2.A.(7) and 2.A.(8).

Jan. 25/63
AB

(5) Test leading edge flaps system (refer to Adjustment/Test Wing Leading Edge Flap Control System Functional Test).

(6) Remove test equipment and return airplane to normal configuration.

2. Adjustment/Test Wing Leading Edge Flap Control System Functional Test

A. Equipment Required.

(1) External source of ac electrical power.

(2) External source of hydraulic power.

(3) Stop watch.

(4) Protractors - (TSTO 30J76 or equivalent) zero to 130 degree range, calibrated in 0.5-degree increments.

(5) Twelve-inch straight edge.

(6) Index pin - 3/16-inch.

(7) Protractor No. 22-18000-901 to measure deflection of LH inboard flap.

(8) Jumper wire - 20 guage.

B. Check Flap Control Cable Installation.

(1) With flap control lever in 0° detent, insert index pin in flap control pulley at aft end of forward cargo compartment (approximately station 656).

(2) Remove index pin (refer to Adjustment/Test Wing Leading Edge Flap Rigging Procedure if index pin cannot be inserted).

(3) Check cable tension (refer to 27-4-0, Adjustment/Test Flap Control System Rigging Procedure).

C. Check Leading Edge Flap Control Switch Operation.

(1) With flap control lever in 0° detent, check that forward and aft flap control switches in flap control unit (approximately station 656) are in the following configurations:

(a) Forward control switch - deactuated (not compressed).

(b) Aft control switch - actuated (compressed).

(2) Move flap control lever 1.30 (±0.20) inches aft of 0° detent, as measured at top surface of pedestal cover. Forward control switch shall be actuated and aft control switch shall remain actuated.

(3) Move flap control lever to 27° detent position. Forward and aft control switches shall remain actuated.

(4) Move flap control lever 0.30 (+0.20, -0.10) inch aft of 27° detent. Aft control switch shall be deactuated and forward control switch shall remain actuated.

(5) Move flap control lever to 50° detent. Forward control switch shall remain actuated and aft control switch shall remain deactuated.

(6) Move flap control lever to 27° detent position. Forward and aft control switches shall be actuated.

(7) Move flap control lever to 0° detent position. Forward control switch shall be deactuated and aft control switch shall be actuated.

D. Check Flap Retracted Stops.

(1) Connect external source of ac electrical power to airplane (refer to Chapter 24, ELECTRICAL POWER).

(2) Close FLAP ASYM CONT, KRUEGER FLAP - CONT, and KRUEGER FLAP - POSITION WARN circuit breakers on main circuit breaker panel.

(3) Place FLAP POWER SELECT switch in NORMAL #1 position.

(4) Place flap control lever in 0° detent.

WARNING: REMOVE ALL OBSTRUCTIONS IN AREA OF CONTROL SURFACE TRAVEL AND WARN ALL PERSONNEL OF INTENDED OPERATION.

(5) Connect external source of hydraulic power to airplane and pressurize No. 1 and No. 2 hydraulic systems (refer to Chapter 29, HYDRAULIC POWER). Trailing and leading edge flaps shall retract.

CAUTION: DO NOT OPERATE FLAPS WHEN BOTH HYDRAULIC SYSTEMS ARE PRESSURIZED UNLESS ELECTRICAL POWER IS APPLIED TO THE AIRPLANE AND THE "FLAP ASYM CONT" CIRCUIT BREAKER IS CLOSED.

(6) With flaps retracted against stops, check that flaps are in contour with wing leading edge (+0.060, -0.000 inch).

(7) If flaps are not in contour, refer to Adjustment/Test Wing Leading Edge Flap Control System Rigging Procedure.

E. Check Flap Actuator Operation.

(1) Install protractors (TSTO 30J76) in the following locations:

(a) Flap No. 1 - Approximate center.

(b) Flap No. 2 - Inboard and outboard ends.

(c) Flap No. 3 - Approximate center.

(d) Flap No. 4 - Approximate center.

(e) Flap No. 5 - Inboard and outboard ends.

(f) Flap No. 6 - Approximate center.

(g) Flap No. 7 - Inboard and outboard ends.

(h) Flap No. 8 - Outboard end.

(2) Retract all flaps against surface stops and adjust protractors to zero degree position.

(3) Fully extend flaps and check that protractors read as follows:

(a) Flaps No. 1, 2 and 3 - 98 (±2) degrees.

(b) Flaps No. 4, 5 and 6 - 114.5 (±2) degrees.

(c) Flaps No. 7 and 8 - 115.5 (±2) degrees.

(4) Using a straight edge, sight along extended edge of flaps in groups as listed in step (3). Each flap must align within ±0.25 inch with adjacent flap.

(5) Check that seals are adjusted to close gap between flaps in the groups listed in step (3). Flaps must be fully extended.

F. Check Flap Retracted Switch Operation.

(1) Spread ends of cotter pin and slip over control switch plunger at switch sleeve.

(2) Slowly retract leading edge flaps and check that NOT RETRACT lights extinguish as flaps reach fully retracted position.

NOTE: Inboard NOT RETRACT light on pilot's instrument panel is controlled by LH flap No. 1 retracted switch. Outboard NOT RETRACT light is controlled by LH flap No. 2 retracted switch.

(3) Lower flaps and check that switch plunger can be compressed beyond new location of cotter pin.

G. Check Leading Edge Flap System Operation.

(1) Move flap control lever to 0° detent and retract leading edge flaps.

(2) The following flap position and warning lights on pilot's instrument panel shall be extinguished:

(a) Inboard NOT RETRACT warning light.

(b) Outboard NOT RETRACT warning light.

(c) TAKEOFF L. E. FLAP EXT position light.

(d) LANDING L. E. FLAP EXT position light.

(3) Depress and then release warning and position light caps listed in step (1). Lights shall illuminate when caps are depressed, and extinguish when caps are released.

(4) Position flap control lever 1.30 (±0.20) inch from 0° detent position, as measured on top surface of pedestal cover. All leading edge flaps shall extend within 16 seconds maximum.

(5) When leading edge flaps are fully extended, TAKEOFF L. E. FLAP EXT position light shall illuminate.

(6) Move flap control lever to 27° detent position. All leading edge flaps shall remain extended and NOT RETRACT warning lights shall remain extinguished. TAKEOFF L. E. FLAP EXT position light shall remain illuminated.

(7) Move flap control lever 0.30 (+0.20, -0.10) inch aft of 27° detent position. Inboard flaps (flap No. 1 on each side) shall retract and flaps No. 2 through 8 shall remain extended. Inboard NOT RETRACT warning light shall illuminate while inboard flaps are in transit. TAKEOFF L. E. FLAP EXT position light shall extinguish.

(8) When inboard flaps are fully retracted, inboard NOT RETRACT warning light shall extinguish and LANDING L. E. FLAP EXT position light shall illuminate.

(9) Move flap control lever to 36° detent and then to 50° detent positions. Outboard and inboard NOT RETRACT lights shall remain extinguished and TAKEOFF L. E. FLAP EXT position light shall remain extinguished. LANDING L. E. FLAP EXT position light shall remain illuminated. Inboard flaps shall remain retracted and outboard flaps shall remain extended.

CONVAIR MODEL 30

MAINTENANCE MANUAL

TEMPORARY REVISION NO. 27-64.

Insert facing 27-10-0, Page 209, dated Feb. 15/63 (or subsequent).

The instructions on the noted facing page are to be used for all applicable airplanes except as follows: for airplanes CV26 through CV34 not modified per either Service Bulletin No. 51-1 (Ammendment No. 13) or Service Bulletin No. 27-45, substitute the following instructions where indicated.

Retain this temporary revision in your manual until all applicable airplanes have been modified per either of the noted service bulletins.

Page 209, delete steps 2.G.(14) through 2.G.(20).

(10) Move flap control lever to 27° detent position. Inboard flaps (flap No. 1 on each side) shall extend. LANDING L.E. FLAP EXT position light shall extinguish.

(11) When inboard flaps have extended, TAKEOFF L.E. FLAP EXT position light shall illuminate.

(12) Inboard leading edge flaps shall begin to retract immediately and be fully retracted within 16 seconds maximum. Outboard leading edge flaps shall begin to retract as trailing edge flaps pass 24 (+2, -4) degree position and be fully retracted within 16 seconds. NOT RETRACT warning lights shall be illuminated while respective (inboard and outboard) leading edge flaps are in transit, and TAKEOFF L.E. FLAP EXT position light shall extinguish.

(13) When leading edge flaps have retracted, NOT RETRACT warning lights shall extinguish. TAKEOFF L.E. FLAP EXT and LANDING L.E. FLAP EXT position lights shall remain extinguished.

(14) Install jumper wire between pins E and M of airspeed warning control switch plug at station 362.

(15) Install protractor (22-18000-901) on LH inboard trailing edge flap.

(16) Move flap control lever to 27° detent. All leading edge flaps shall extend and TAKEOFF L.E. FLAP EXT position light shall illuminate. Trailing edge flaps shall extend to 27 degree position.

(17) ADJUST FLAPS warning light on pilots' instrument panel shall illuminate.

(18) Slowly move flap control lever forward until ADJUST FLAPS warning light is extinguished. Trailing edge flaps shall have retracted to 24 (+2, -4) degree position when ADJUST FLAP warning light extinguishes.

(19) Move flap control lever to 0° detent and allow all trailing and leading flaps to retract.

(20) Remove jumper wire from airspeed warning control switch plug.

(21) Remove test equipment and return airplane to normal configuration.

3. Adjustment/Test Wing Leading Edge Flap Hydraulic System Bleeding Procedure

A. General.

After breaking into or replacing a component in the wing leading edge flap hydraulic system, the hydraulic system must be bled to remove any entrapped air.

B. Equipment Required.

(1) External source of ac electrical power.

(2) External source of hydraulic power.

C. Bleed Wing Leading Edge Flap Hydraulic System.

NOTE: The following procedure must be performed with the trailing edge flaps "full up". If the trailing edge flaps are extended more than approximately 20 degrees, the outboard leading edge flaps will not cycle.

(1) Connect external source of ac electrical power to airplane (refer to Chapter 24, ELECTRICAL POWER).

(2) Close FLAP ASYM CONT, KRUEGER FLAP - CONT, and KRUEGER FLAP - POSITION WARN circuit breakers on main circuit breaker panel.

(3) Place FLAP POWER SELECT switch in NORMAL #1 position.

(4) Place flap control lever in 0° detent.

WARNING: REMOVE ALL OBSTRUCTIONS IN AREA AND WARN ALL PERSONNEL OF INTENDED OPERATION.

(5) Connect external source of hydraulic power to airplane, and pressurize only No. 2 hydraulic system (refer to Chapter 29, HYDRAULIC POWER). Leading edge flaps shall retract.

NOTE: Pressurizing only No. 2 hydraulic system allows operation of only the wing leading edge flaps. To operate the trailing edge and leading edge flaps simultaneously, accomplish steps (1) through (5). In step (5), pressurize both hydraulic systems.

CAUTION: DO NOT OPERATE FLAPS WHEN BOTH HYDRAULIC SYSTEMS ARE PRESSURIZED UNLESS ELECTRICAL POWER IS APPLIED TO THE AIRPLANE AND THE "FLAP ASYM CONT" CIRCUIT BREAKER IS CLOSED.

(6) Cycle leading edge flaps 10 times as follows:

(a) Actuate flap control lever to 10° detent and allow all flaps to extend.

(b) Actuate flap control lever to 0° detent and allow all flaps to retract.

(7) Depressurize hydraulic systems (refer to Chapter 12, SERVICING).

(8) Disconnect external source of electrical power (refer to Chapter 24, ELECTRICAL POWER).

WING LEADING EDGE FLAPS - MAINTENANCE PRACTICES

1. Removal/Installation Leading Edge Flaps (see Figure 201)

A. Equipment Required.

(1) Stand suitable for reaching wing leading edges.

(2) Primer - EC1662 (Minnesota Mining and Mfg.) or equivalent.

(3) Sealing compound - EC 1667 (Minnesota Mining and Mfg.) or equivalent.

B. General.

The eight leading edge flaps on each wing are similar except for size, number of actuators, and number of hinges. The flaps are numbered from one through eight on each wing, beginning with the inboard flap.

C. Remove Leading Edge Flaps No. 1 through 6.

(1) Depressurize hydraulic systems (refer to Chapter 12, SERVICING).

(2) Remove hydraulic actuator attaching bolts at flap.

(3) Remove flap hinge bolts at wing leading edge.

(4) Remove flap.

D. Install Leading Edge Flaps No. 1 through 6.

(1) Position flap and install hinge bolts.

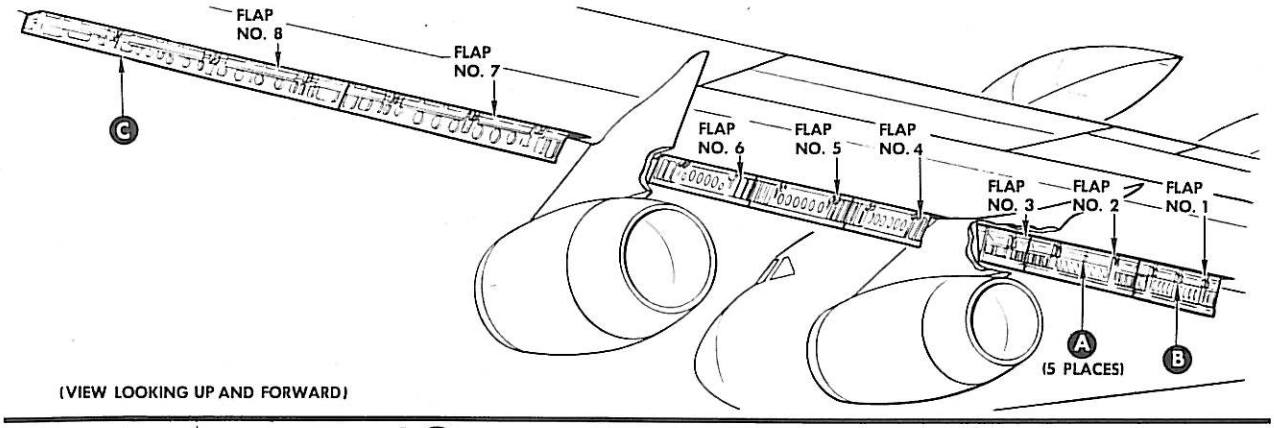
(2) Attach flap actuators to flap hinge. Apply special torque as follows to the actuator-to-flap attaching bolts:

(a) Flaps No. 1, 2, and 3 actuator-to-flap attaching bolts - from 38 to 42 foot-pounds.

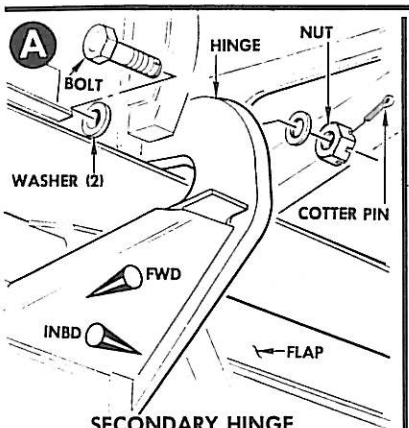
(b) Flaps No. 4, 5, and 6 actuator-to-flap attaching bolts - from 40 to 57 foot-pounds.

(3) Check operation of flaps (refer to Adjustment/Test Leading Edge Flaps Functional Test).

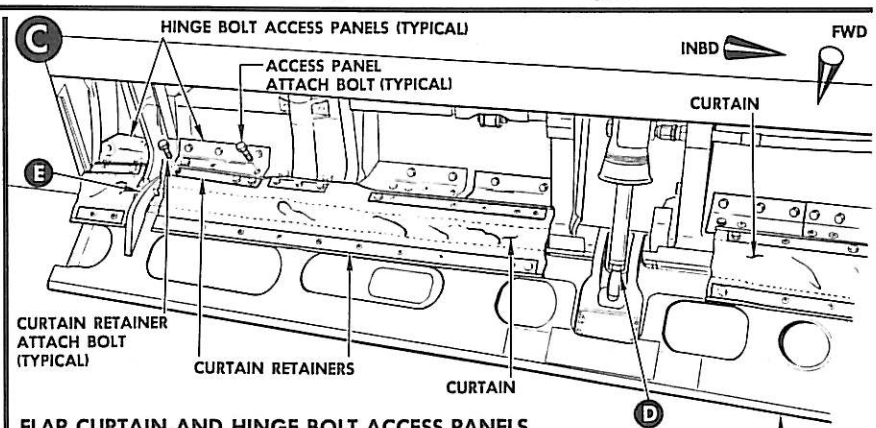
NOTE: If only a flap has been replaced and no other rigging or adjustment has been changed, check flap adjustment and travel per 27-10-0, paragraphs D., E., and F.



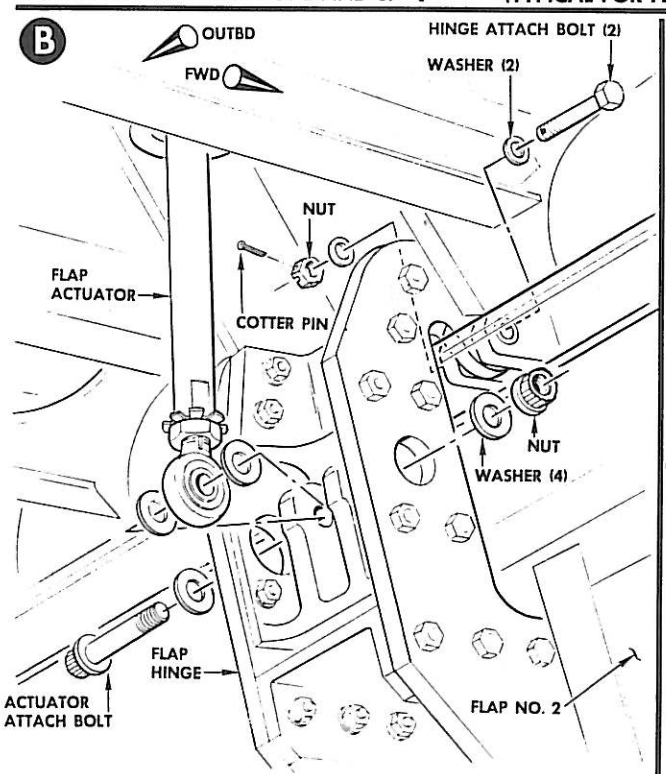
(VIEW LOOKING UP AND FORWARD)



SECONDARY HINGE
(TYPICAL FOR FLAPS NO. 2 AND 3)



FLAP CURTAIN AND HINGE BOLT ACCESS PANELS
(TYPICAL FOR FLAPS NO. 7 AND 8)



FLAP ACTUATOR AND MAIN HINGE
(TYPICAL FOR FLAPS NO. 1 THROUGH 6)

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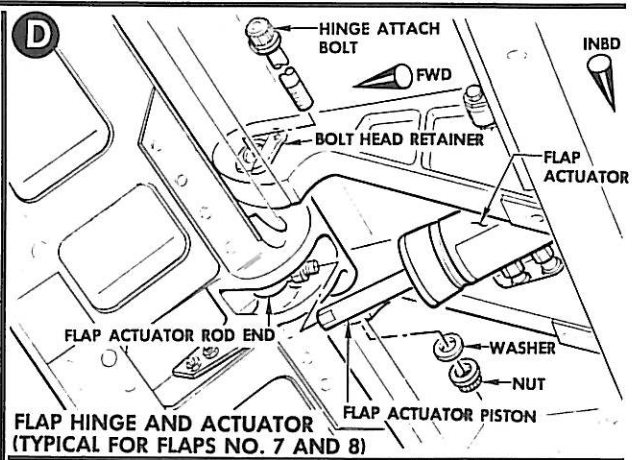
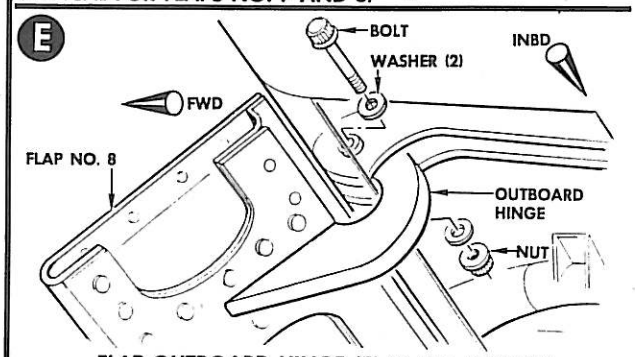


FLAP HINGE AND ACTUATOR
(TYPICAL FOR FLAPS NO. 7 AND 8)



FLAP OUTBOARD HINGE (FLAP NO. 8 ONLY)

E. Remove Leading Edge Flaps No. 7 and 8.

(1) Depressurize hydraulic systems (refer to Chapter 12, SERVICING).

(2) Remove forward side of curtain between wing leading edge and flap.

(3) Remove actuator attaching bolts at flap.

NOTE: If old flap is being reinstalled, loosen lock nut at actuator piston rod end and unscrew piston from rod end. Mark actuator piston with tape and count turns required to free rod end.

(4) Remove access panels at each end of flap hinge bolts.

(5) Remove flap hinge bolts; remove flap.

F. Install Leading Edge Flaps No. 7 and 8.

(1) Position flap and install hinge bolts. Apply special torque as follows:

(a) Flap No. 7 hinge bolts - from 160 to 190 inch-pounds.

(b) Flap No. 8 hinge bolts - from 100 to 140 inch-pounds.

(2) Attach flap actuators to flap hinge. Apply special torque as follows:

(a) Flap No. 7 actuator-to-flap attaching bolts - from 38 to 42 foot-pounds.

(b) Flap No. 8 actuator-to-flap attaching bolts - from 13 to 16 foot-pounds.

NOTE: If actuator rod end was not removed from flap, screw actuator piston on rod end same number of turns counted in step E.3. Remove tape from piston.

(3) Install curtain between wing leading edge and flap.

(4) Install access panels at flap hinge bolts. Remove old sealant and apply primer (EC1662) and sealing compound (EC1667) at edges of access panels.

(5) Check operation of flaps (refer to Adjustment/Test Leading Edge Flaps Control System Functional Test).

NOTE: If only a flap has been replaced and no other rigging or adjustment has been changed, check flap adjustment and travel per 27-10-0, paragraphs D., E., and F.

WING LEADING EDGE FLAP ACTUATORS - MAINTENANCE PRACTICES

1. Removal/Installation Leading Edge Flap Actuators (see Figure 201)

A. Equipment Required - Stand suitable for reaching wing leading edge.

B. Remove Leading Edge Flap Actuators.

(1) Depressurize hydraulic systems (refer to Chapter 12, SERVICING).

(2) If removing actuators from flaps No. 1 through 3, remove actuator lower attaching bolt. Note location of washers.

(3) If removing actuators from flaps No. 4 through 8, remove actuator upper and lower attaching bolts. Note location of washers.

(4) Disconnect hydraulic lines and cap lines and fittings.

NOTE: With actuator fully extended, measure and record distance between centers of actuator attaching bolt holes.

(5) If removing actuators from flaps No. 1 through 3, remove actuator upper fitting attach bolts. Lower actuator and remove fitting from actuator. Note location of washers.

C. Install Leading Edge Flap Actuators.

NOTE: With actuator fully extended, adjust actuator rod end to obtain same distance between centers of actuator attaching bolt holes as measured at actuator removal.

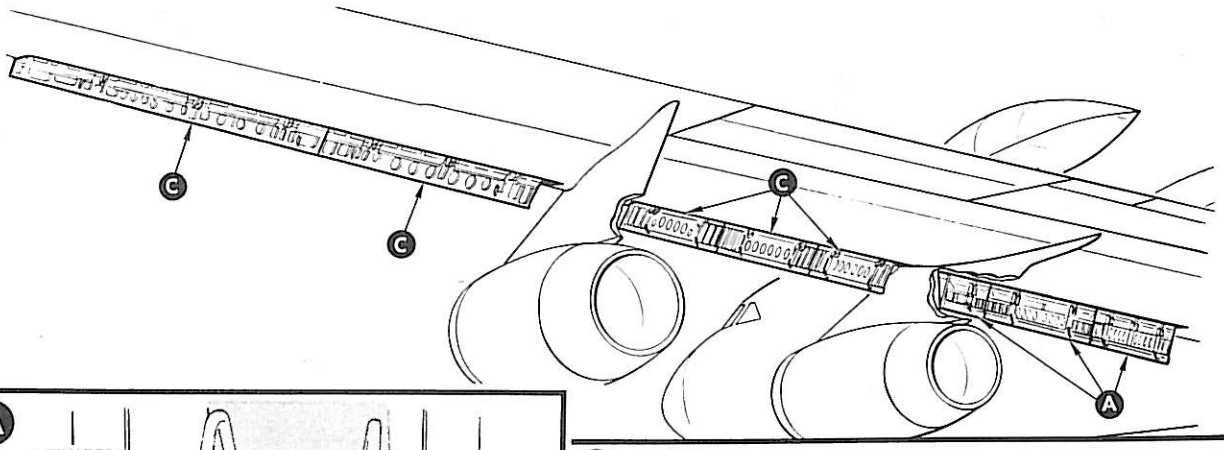
(1) If installing actuators on flaps No. 1 through 3, install upper attach fitting on actuator. Install washers as noted at removal, and torque bolt to between 38 to 42 foot-pounds. Install actuator and fitting in wing leading edge.

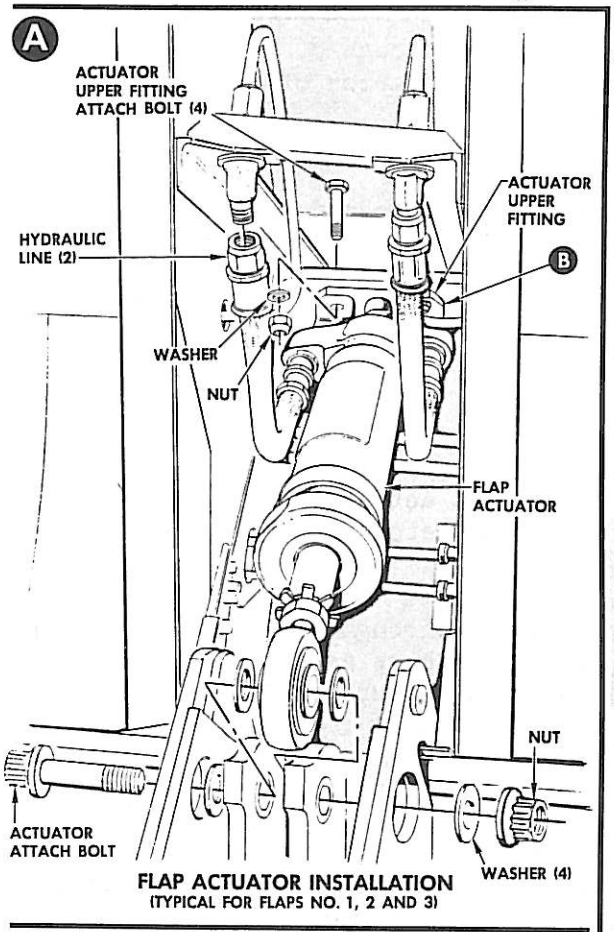
(2) Remove caps from hydraulic lines and connect lines to actuators.

(3) If installing actuators on flaps No. 4 through 8, install actuator upper and lower attaching bolts. On flaps No. 4, 5, and 6, torque attaching bolts to between 40 and 57 foot-pounds. On flap No. 7, torque attaching bolts to between 38 and 42 foot-pounds. On flap No. 8, torque attaching bolts to between 13 and 16 foot-pounds.

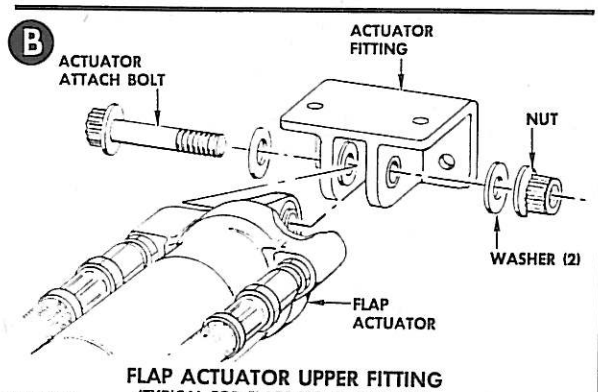
CAUTION: TO PREVENT DAMAGE TO TUBING IN WING LEADING EDGE, INSTALL ACTUATORS ON FLAP NO. 7 WITH UPPERMOST HYDRAULIC PORT AT FORWARD END OF CYLINDER.

(4) If installing actuators on flaps No. 1 through 3, install actuator lower attaching bolt. Torque bolt to between 38 and 42 foot-pounds.





FLAP ACTUATOR INSTALLATION
(TYPICAL FOR FLAPS NO. 1, 2 AND 3)



FLAP ACTUATOR UPPER FITTING
(TYPICAL FOR FLAPS NO. 1, 2 AND 3)

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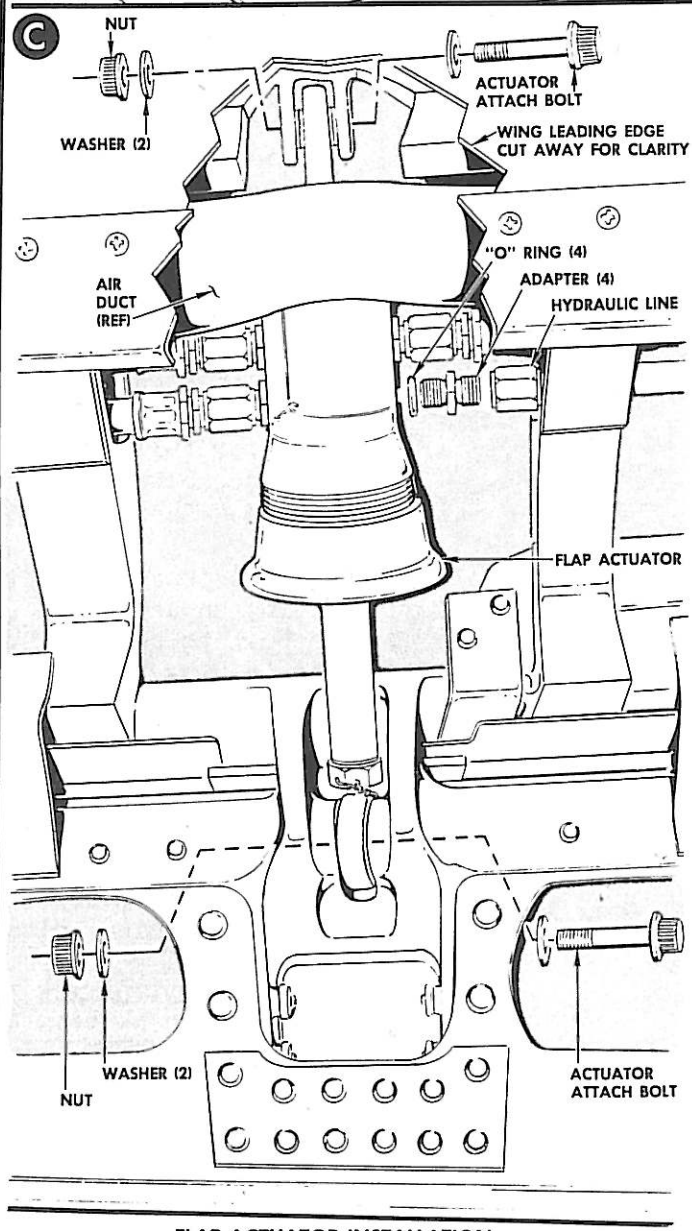


FLAP ACTUATOR INSTALLATION
(TYPICAL FOR FLAPS NO. 4 THROUGH 8)

(5) Bleed leading edge flap system (refer to Adjustment/Test Leading Edge Flap Bleeding Procedure).

(6) Check operation of flaps (refer to 27-10-0, Adjustment/Test Leading Edge Flap Control System Functional Test).

NOTE: If a flap actuator only has been replaced and no other rigging or adjustment has been changed, no further rigging or adjustment is required. Check flap travel per 27-10-0, paragraph 2.E.

WING LEADING EDGE FLAP HYDRAULIC PRESSURE SWITCHES - MAINTENANCE PRACTICES

1. Removal/Installation Leading Edge Flap Hydraulic Pressure Switches (see Figure 201)

   A. Equipment Required - Stand suitable for reaching wing leading edge.

   B. Remove Wing Leading Edge Flap Pressure Switches.

      (1) Depressurize hydraulic systems (refer to Chapter 12, SERVICING).

      (2) Open KRUEGER FLAP - POSITION WARN circuit breaker on main circuit breaker panel.

      (3) Remove pressure switch electrical connector.

      (4) Remove hydraulic line from pressure switch and cap line and fitting.

      (5) Remove two bolts and clamp attaching switch to structure; remove switch.

   C. Install Wing Leading Edge Flap Pressure Switches.

      (1) Position switch and install bolts; clamp attaching switch to structure.

      (2) Remove caps from hydraulic line and pressure switch; connect hydraulic line to pressure switch.

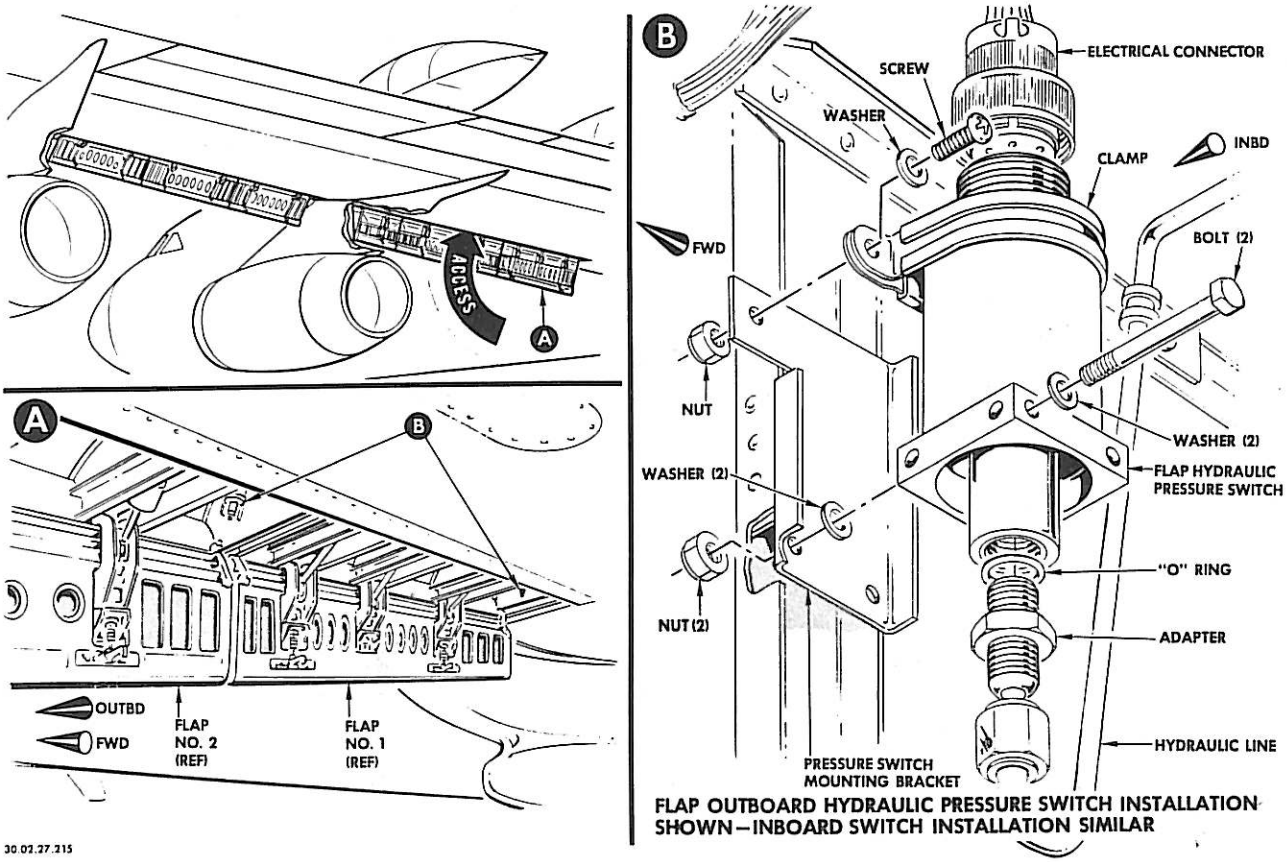
      (3) Connect electrical connector to pressure switch.

      (4) Close KRUEGER FLAP - POSITION WARN circuit breaker on main circuit breaker panel.

      (5) Bleed wing leading edge flap hydraulic system (refer to 27-10-0, Adjustment/Test Wing Leading Edge Flap Hydraulic System Bleeding Procedure).

      (6) Check pressure switch operation (refer to Adjustment/Test Wing Leading Edge Flap Control System Functional Test).

      NOTE: If a pressure switch only has been replaced and no other rigging or adjustment has been changed, no further rigging or adjustment is required. Check flap hydraulic pressure switch operation per 27-10-0, paragraph 2.G.



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FLAP OUTBOARD HYDRAULIC PRESSURE SWITCH INSTALLATION SHOWN—INBOARD SWITCH INSTALLATION SIMILAR

WING LEADING EDGE FLAP RETRACTED SWITCHES - MAINTENANCE PRACTICES

1. Removal/Installation Leading Edge Flap Retracted Switches (see Figure 201)

A. Equipment Required.

(1) Stand suitable for reaching wing leading edge.

(2) External source of ac electrical power.

(3) External source of hydraulic power.

B. Remove Leading Edge Flap Retracted Switches.

(1) Depressurize hydraulic systems (refer to Chapter 12, SERVICING).

(2) Open KRUEGER FLAP - CONT and KRUEGER FLAP - POSITION WARN circuit breakers on main circuit breaker panel.

NOTE: The flap retracted switches are installed in the wing leading edge at the inboard ends of LH flaps No. 1 and 2.

(3) Measure and record distance from switch mounting bracket to tip of switch plunger roller.

(4) Remove switch mounting nut and remove switch.

(5) Disconnect wiring from switch.

C. Install Leading Edge Flap Retracted Switches.

(1) Install switch in mounting bracket and adjust to measurement recorded in step B.(3).

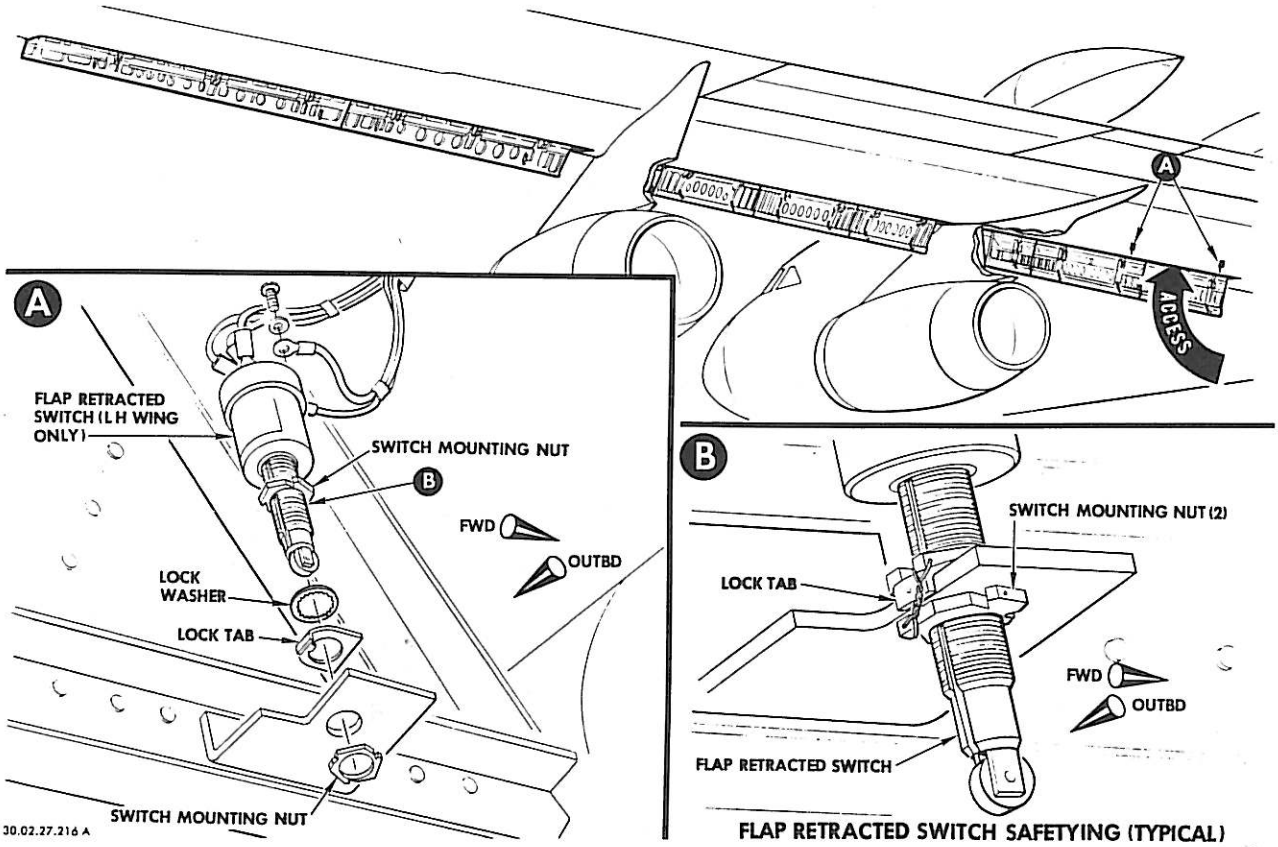
(2) Connect wiring to switch.

(3) Safety switch mounting nuts.

(4) Close KRUEGER FLAP - CONT and KRUEGER FLAP - POSITION WARN circuit breakers.

(5) Check switch operation (refer to 27-10-0, Adjustment/Test Wing Leading Edge Flap Control System Functional Test).

NOTE: If a flap retracted switch only has been replaced and no other rigging or adjustment has been changed, no further rigging or adjustment is required. Check flap retracted switch operation per 27-10-0, paragraph 2.F.



FLAP RETRACTED SWITCH SAFETYING (TYPICAL)

CONVAIR MODEL 30

MAINTENANCE MANUAL

TEMPORARY REVISION NO. 27-65.

Insert facing 27-10-5, Page 201, dated Feb. 15/63 (or subsequent).

The instructions on the noted facing page are to be used for all applicable airplanes except as follows: for airplanes CV26 through CV34 not modified per either Service Bulletin No. 51-1 (Ammendment No. 13) or Service Bulletin No. 27-45, substitute the following instructions where indicated.

Retain this temporary revision in your manual until all applicable airplanes have been modified per either of the noted service bulletins.

Page 201, delete steps 2.G.(14) through 2.G.(21) in note following step C.(6).

Jan. 25/63
AB

WING LEADING EDGE FLAP CONTROL VALVES - MAINTENANCE PRACTICES

1. Removal/Installation Leading Edge Flap Control Valves (see Figure 201)

A. Equipment Required - Container suitable for catching hydraulic fluid.

B. Remove Leading Edge Flap Control Valve.

(1) Depressurize hydraulic system No. 2 (refer to Chapter 12, SERVICING).

(2) Open KRUEGER FLAP - CONT and KRUEGER FLAP - POSITION WARN circuit breakers on main circuit breaker panel.

(3) Remove forward and inboard panels from leading edge flap control unit housing.

(4) Disconnect electrical connector from control valve.

(5) Disconnect hydraulic lines from control valve. Cap lines and fittings.

(6) Remove two bolts attaching control valve to structure.

C. Install Leading Edge Flap Control Valve.

(1) Position control valve and install two attaching bolts.

(2) Remove caps from hydraulic lines and fittings, and connect lines to control valve.

(3) Connect electrical connector to control valve.

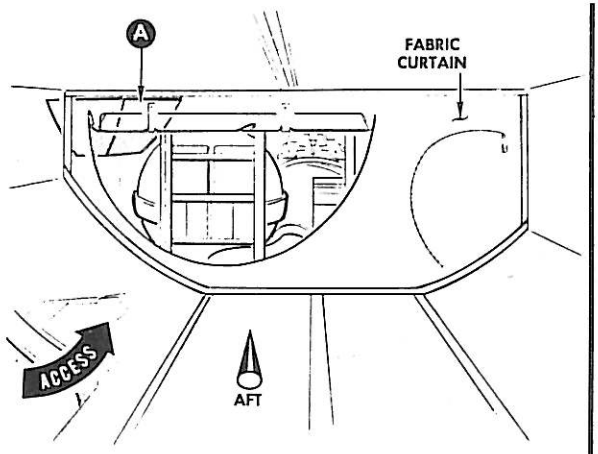
(4) Close KRUEGER FLAP - CONT and KRUEGER FLAP - POSITION WARN circuit breakers on main circuit breaker panel.

(5) Bleed wing leading edge flap hydraulic system (refer to 27-10-0, Adjustment/Test Wing Leading Edge Flap Hydraulic System Bleeding Procedure).

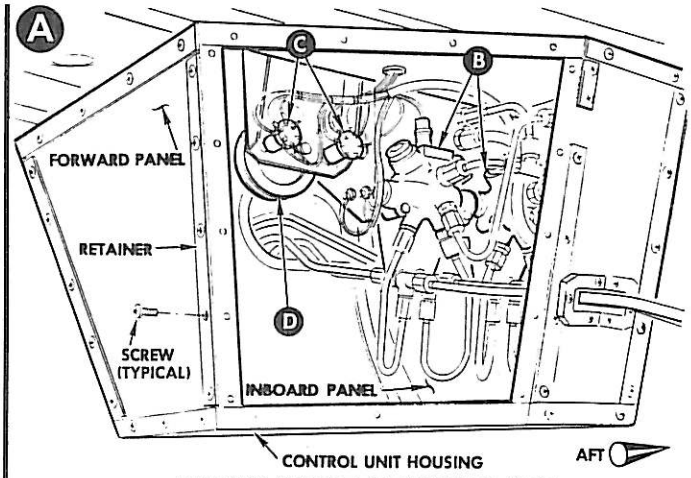
(6) Check leading edge flap control valve operation (refer to Adjustment/Test Wing Leading Edge Flap Control System Functional Test).

NOTE: If only a control valve has been replaced and no other rigging or adjustment has been changed, no further rigging or adjustment is required . Check control valve operation per 27-10-0, steps 2.G.(4), 2.G.(6), 2.G.(7), 2.G.(9), 2.G.(10), 2.G.(12) and 2.G.(14) through 2.G.(21).

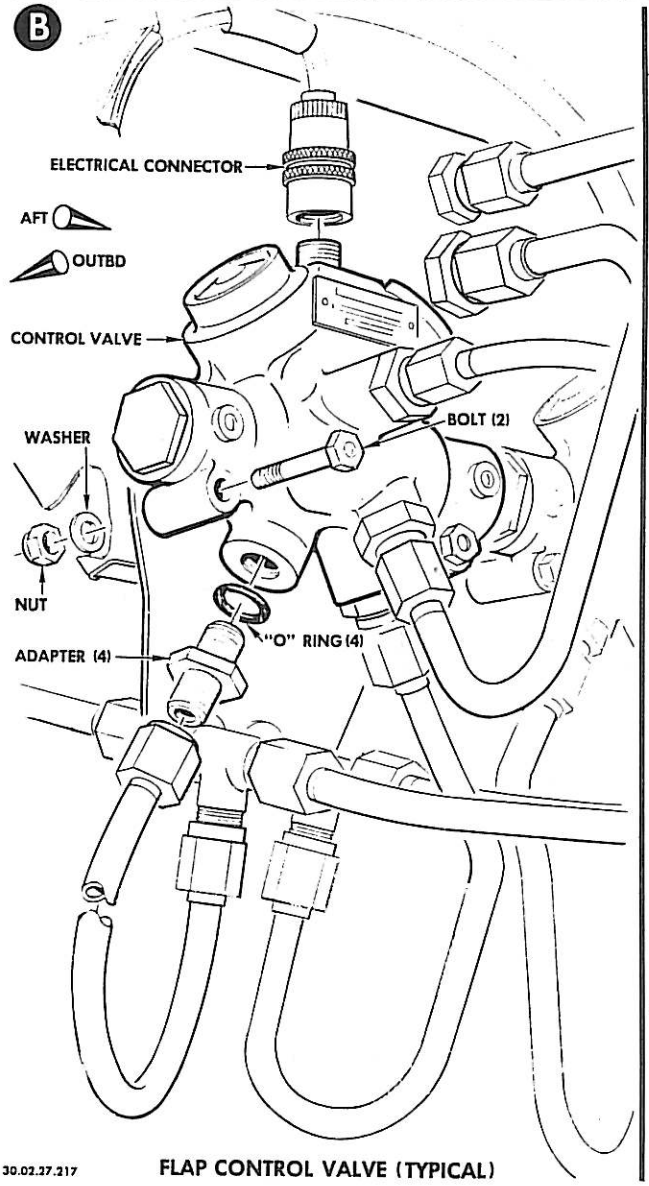
(7) Install control unit housing panels.



FORWARD CARGO COMPARTMENT



LEADING EDGE FLAP CONTROL UNIT



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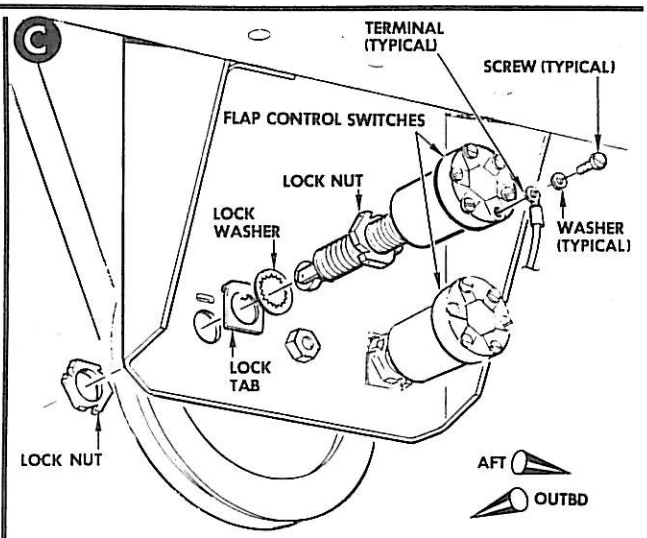
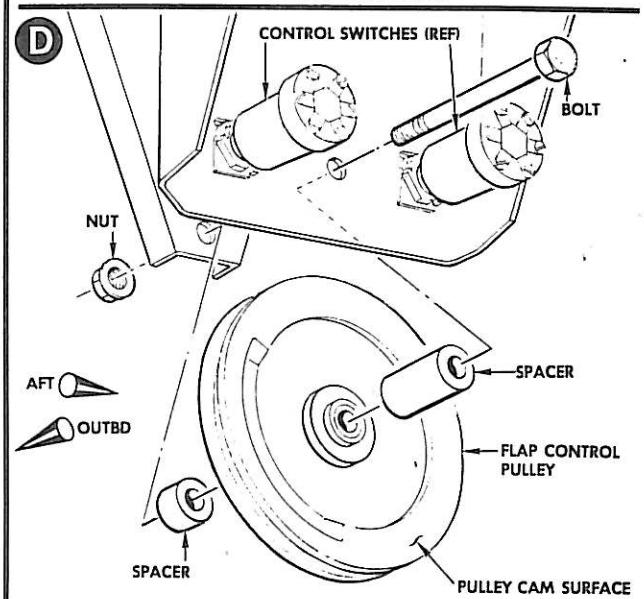
FLAP CONTROL VALVE (TYPICAL)



FLAP CONTROL SWITCH



FLAP CONTROL PULLEY

Wing Leading Edge Flap Control Valves,
Control Switches, and Control Pulley Installation
Figure 201

WING LEADING EDGE FLAP CONTROL SWITCHES - MAINTENANCE PRACTICES

1. Removal/Installation Leading Edge Flap Control Switches (see 27-10-5, Figure 201)

A. Equipment Required - None.

B. Remove Leading Edge Flap Control Switches.

(1) Open KRUEGER FLAP - CONT and KRUEGER FLAP - POSITION WARN circuit breakers on main circuit breaker panel.

(2) Remove forward and inboard panels from leading edge flap control unit housing.

(3) Disconnect wiring from control switch.

(4) Measure and record distance from switch mounting bracket to switch plunger roller tip.

(5) Remove switch mounting nut; remove switch.

C. Install Leading Edge Flap Control Switches.

(1) Position switch on mounting bracket, install mounting nut, and adjust to measurement recorded in step B.(4). Safety control switch mounting nuts.

(2) Connect wiring to control switch.

(3) Close KRUEGER FLAP - CONT and KRUEGER FLAP - POSITION WARN circuit breakers on main circuit breaker panel.

(4) Check operation of flap control switches (refer to Adjustment/Test Wing Leading Edge Flap Control System Functional Test).

NOTE: If a control switch only has been replaced and no other rigging or adjustment has been changed, no further rigging or adjustment is required. Check operation of control switches per 27-10-0, paragraph 2.C., paragraph 2.D., steps (1) through (5), and paragraph 2.G.

(5) Install control unit housing panels.

WING LEADING EDGE FLAP CONTROL PULLEY - MAINTENANCE PRACTICES

1. Removal/Installation Leading Edge Flap Control Pulley (see 27-10-5, Figure 201)

   A. Equipment Required.

      (1) Index pin - 3/16-inch diameter.

      (2) Standard cable tensiometer.

   B. Remove Leading Edge Flap Control Pulley.

      (1) Loosen flap RH control cable Turnbuckle at approximately station 627.

      (2) Remove forward and inboard panels from leading edge control unit housing.

      (3) Remove control pulley. Use care not to damage flap control switches when removing pulley.

   C. Install Leading Edge Flap Control Pulley.

      (1) Place control pulley in position and install attaching bolt. Use care not to damage flap control switches.

      (2) Position cable fitting in pulley and tighten cable (refer to 27-4-0, Adjustment/Test Flap Control System Rigging Procedure, Paragraph B, steps (2) through (6)).

      (3) Check leading edge flap system operation (refer to Adjustment/Test Wing Leading Edge Flap Control System Functional Test) and check trailing edge flap system operation (refer to Adjustment/Test Flap Control System Functional Test).

         NOTE: If only the flap control pulley has been replaced and no other rigging or adjustment has been changed, no further rigging or adjustment is required. Check leading edge flap system operation per 27-10-0, paragraph 2.G., and check trailing edge flap operation per 27-4-0, paragraph 2.G.

      (4) After all checks are satisfactory, install control unit housing panels.

WING LEADING EDGE FLAP RELAYS - MAINTENANCE PRACTICES

1. Removal/Installation Leading Edge Flap Relays (see Figure 201)

   A. Equipment Required - None.

   B. Remove Flap Relay.

      (1) Open KRUEGER FLAP - CONT and KRUEGER FLAP - POSITION WARN circuit breakers on main circuit breaker panel.

      (2) Remove two relay attaching bolts.

      (3) Remove relay from receptacle.

   C. Install Flap Relays.

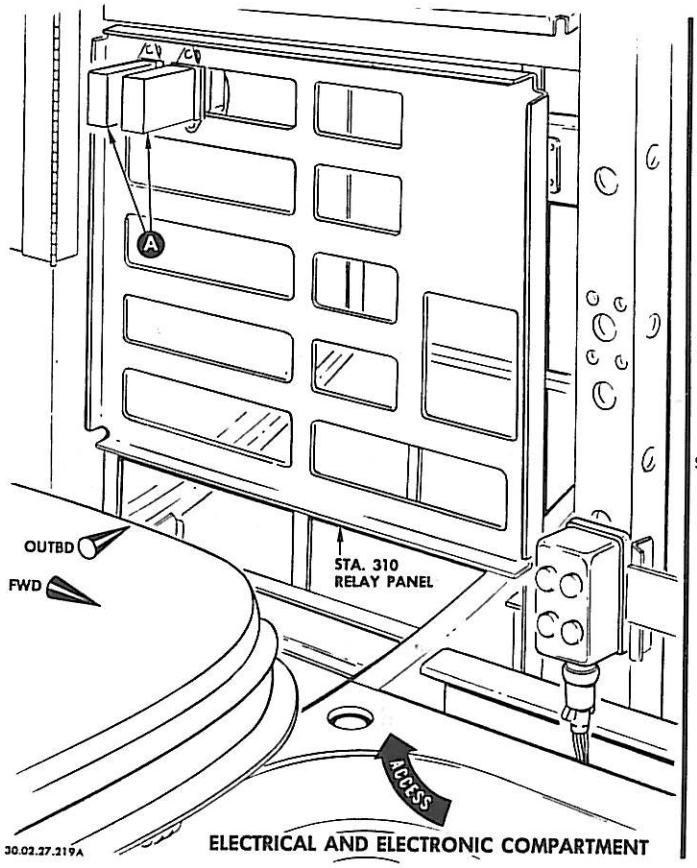
      (1) Plug relay into receptacle.

      (2) Install two relay attaching bolts.

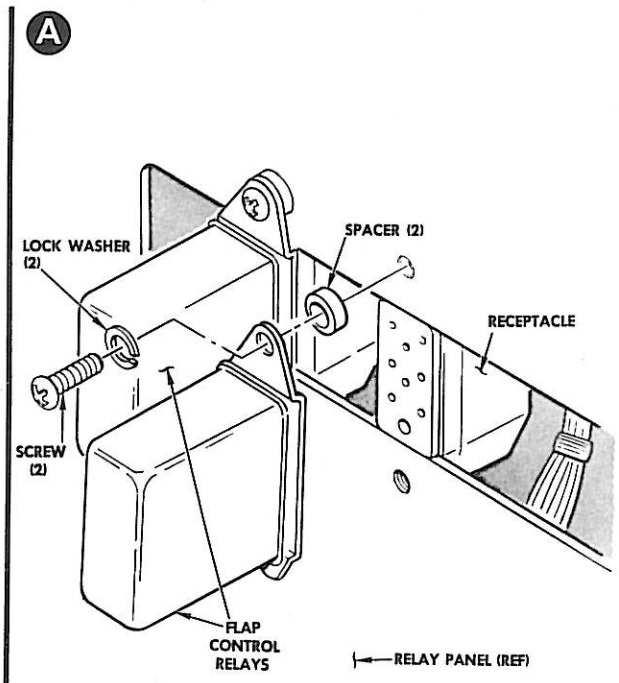
      (3) Close KRUEGER FLAP - CONT and KRUEGER FLAP - POSITION WARN circuit breakers on main circuit breaker panel.

      (4) Check operation of flap relays (refer to Adjustment/Test Wing Leading Edge Flap Control System Functional Test).

      NOTE: If only a flap relay has been replaced and no other rigging or adjustment has been changed, no further rigging or adjustment is required. Check relay operation per 27-10-0, paragraph 2.G.



ELECTRICAL AND ELECTRONIC COMPARTMENT



FLAP CONTROL RELAYS